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AN EMPIRICAL INVESTIGATION OF ECONOMIC REGULATION IN THE NURSING HOME INDUSTRY

By

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To my husband, John

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ABSTRACT

Since over half of all nursing home resident days are funded by Medicaid, one critical issue facing policy makers and voters is the appropriate funding for Medicaid patients and the associated implications for quality of care. Nursing home owners have long insisted that the Medicaid program does not reimburse them enough to cover the costs of providing quality care to Medicaid funded patients. However, it is not clear whether nursing home owners are actually losing money on Medicaid residents. Thus, one question concerning funding of nursing home care that is often posed is as follows: do states currently pay nursing homes enough to cover the costs of Medicaid patients, or are Medicaid patients being subsidized by other residents in nursing homes?

To motivate the empirical estimation of the relationship between quality, reimbursement rates, and patient mix in the dissertation, a model of nursing home behavior formulated in the spirit of Scanlon (1980), Nyman (1985, 1989), and Copeland (1997) is presented that includes three groups of nursing home patients: Medicare funded, Medicaid funded, and private pay. After establishing the relationships theoretically, a combination of Florida facility and resident level data for nursing homes from 1987-1996 is utilized to answer key questions regarding nursing home behavior.

In the first empirical essay, the degree of subsidization of Medicaid patients by private pay patients in nursing homes given Medicaid reimbursement rates is considered. In other words, the following question is asked: does the state pay nursing homes enough

to cover the costs of Medicaid patients, or are Medicaid patients being subsidized by private pay residents and/or Medicare funded residents in nursing home? Direct evidence of cross-subsidization is found for approximately one-quarter to one-third of Florida's nursing homes, where cross-subsidizing nursing homes are more likely to be located in markets with fewer beds per elderly capita, a measure of the restrictiveness of the CON program. In addition, it is determined that Medicaid residents are clustered in low cost and low quality homes, and preliminary evidence suggests that Medicaid residents may be receiving a lower level of quality than other payer types within a given nursing home.

The second set of empirical issues that is considered revolves around the issue of government regulation of nursing homes in the following areas: government established Medicaid reimbursement rates and Certificate-of-Need (CON) policy. In this chapter, the impact of these regulatory measures on nursing home quality, nursing home costs, and the proportion of Medicaid residents in the nursing home is considered. When controlling for facility specific characteristics, it is evident that the CON program has a negative impact on the proportion of Medicaid residents in a nursing home and that CON policies that restrict the number of beds per elderly capita in a market have no effect on quality and on costs. When examining changes in Medicaid reimbursement rate-setting methodology, the evidence reveals that nursing homes respond to rate-related incentives to alter the proportion of Medicaid residents in the nursing home and respond to decreased incentives to constrain costs.

INTRODUCTION

As state budgets remain lean and political trends toward deregulation persist, one must question what the future holds for health care for the aged and, in particular, nursing homes. Costs of nursing home care and concerns about fraud and abuse in the system of health care provision to the elderly have been growing. As our population ages, families are less able to shoulder the mounting costs of elder care. Furthermore, working daughters and daughters-in-law are more firmly tied to the labor force than ever before in the history of the United States and are less likely to be in a position to care for the elderly in the home. As the issues of quality, affordability, and access weigh heavily on the minds of more and more Americans, questions of funding and regulation of the industry confront policy makers.

In an effort to shed light on some of these pressing questions, this dissertation analyzes the impact of regulatory measures and market forces on nursing homes and their residents. To motivate the empirical estimation in the subsequent essays, the next chapter outlines the relevant literature and presents a model of nursing home behavior formulated in the spirit of Scanlon (1980), Nyman (1985, 1989), and Copeland (1997). In their models, nursing home residents are segmented into two groups: private-pay patients and Medicaid funded patients, where Medicare funded patients are grouped with private-pay patients. The designation of only two groups of payer types is based upon the fact that, at the time that many of these models were formulated, Medicare patients constituted a relatively small portion of the total population of nursing home residents and provided a small portion of nursing home revenues. However, by 1996, in Florida Medicare patients constituted almost twenty percent of the nursing home population and provided nearly 36 percent of total revenue. Given this trend, a model is formulated with three groups of patients: Medicare funded, Medicaid funded, and private-pay.

In the first of two empirical essays, the degree of subsidization of Medicaid patients by private-pay patients in nursing homes given Medicaid reimbursement rates is considered. In other words, the following question is asked: does the state currently pay nursing homes enough to cover the costs of Medicaid patients, or are Medicaid patients are being subsidized by private-pay residents and/or Medicare funded residents in nursing homes? If the state does not cover the costs of care for Medicaid residents, nursing homes that are forced under CON restrictions to accept a fixed proportion of Medicaid residents may be driven to engage in the taxation of self-pay residents in the form of higher self-pay reimbursement rates, which inevitably results in a welfare loss.

By examining alternative explanations for the empirical observation that private-pay rates are often greater than Medicaid reimbursement rates, the existence of cost shifting in nursing homes between payer types is considered. Direct evidence of cross-subsidization is found in approximately one-quarter to one-third of Florida's nursing homes. In addition, Medicaid residents are determined to be clustered in low cost and low quality homes, and preliminary evidence suggests that Medicaid residents may be receiving a lower level of quality than other payer types within a given nursing home.

In the final essay, the impact of competitive forces and regulatory measures on nursing home quality, nursing home costs, and the proportion of Medicaid patients in the nursing home is studied. In particular, the investigation focuses on the effects of the Certificate-of-Need (CON) program and of changes in the Medicaid reimbursement rate methodology. When controlling for facility specific characteristics, the CON program is found to have a negative impact on the proportion of Medicaid residents in a nursing home, no effect on quality, and no effect on costs. When examining changes in Medicaid reimbursement rate-setting methodology, nursing homes are found to respond to incentives to increase the proportion of Medicaid residents in the nursing home.

CHAPTER 1

LITERATURE REVIEW AND MODEL OF NURSING HOME BEHAVIOR

History of the Nursing Home Industry

Before discussing key characteristics of nursing homes, it is important to consider the foundation and development of the industry over the late nineteenth and early twentieth centuries. Waldman (1983) argues that five types of facilities from this period contributed to the modern nursing home industry: county poorhouses, state mental hospitals, voluntary homes for the aged, proprietary boarding houses, and hospital-affiliated nursing homes. County poorhouses, which disappeared in the 1930s and 1940s , were operated and financed by local governments. The decline of this institution was brought about by reform efforts and by the enactment of social security legislation in 1935. The Social Security Act gave a large group the means with which to choose independent ways for managing life, and subsequent administrative rulings approved payments directly to nursing homes. However, as late as the 1940s, approximately one quarter of all institutionalized aged were confined to mental hospitals (Waldman 1983).

The aged were also housed in homes for the aged established by immigrant groups and voluntary and religious organizations. The voluntary and religious owned facilities evolved, in time, into the non-profit sector of the nursing home industry, while today's proprietary nursing home sector has its roots in the proprietary boarding houses from the nineteenth and early twentieth centuries. While the industry has been consistently dominated by for-profit entities during the second half of the twentieth century, there has been notable growth in chain ownership of nursing homes over the same period. For example, in Florida, in 1987, only 38 percent of all nursing homes were owned by chains, while, by 1996, 68 percent of nursing homes were chain-owned.

A final historical component of today's nursing home industry is the hospital-affiliated nursing home. As hospitals evolved into centers for the treatment of acute care illnesses, hospitals began constructing separate nursing home facilities. The construction of such hospital based nursing homes increased in the 1980s with the advent of prospective payment for hospital care, as hospitals found themselves operating at levels significantly below capacity and began converting acute care beds to nursing home beds. This move largely resulted from the relatively generous Medicare payment level for post-hospitalization nursing home care.

Many pieces of legislation, like the Social Security Act of 1935, mentioned above, have played an important role in shaping the nursing home industry. The most recent legislation to have a profound impact on the nursing home industry is The Omnibus Budget Reconciliation Act of 1987 (OBRA 87). OBRA 87, which is often referred to as the nursing home reform law, was passed in response to general concerns about quality of care at nursing homes where residents were funded by Medicaid or Medicare (Congressional Research Service 1993). Preceding the legislation, a 1986

Institute of Medicine (IOM) report, which reviewed the federal regulation of nursing home providers, determined that the quality of care provided by many nursing homes was unsatisfactory. The IOM report recommended a stronger Federal role to improve the quality of life for nursing home residents.

The OBRA 87 legislation removed the distinction between skilled nursing facilities and intermediate care facilities and focused on three key regulatory areas: it established requirements that nursing facilities must meet to participate in the Medicaid program, it established the survey and certification process that states must use for determining whether nursing homes comply with requirements, and it determined sanctions and enforcement actions. The established requirements, effective October 1, 1990, include the following provisions regarding staffing: nursing facilities must provide 24-hour licensed nursing care, must use a registered nurse at least eight consecutive hours a day seven days a week, and must use as nurse aides only individuals who have completed an approved training program. The legislation also requires that nursing facilities conduct, shortly after admission, a comprehensive assessment of each resident's functional capacity, which must be updated periodically. Each assessment is to be used to develop a written care plan. The legislation clearly led to the collection of facility and resident specific information, some of which will be used in this dissertation.

The OBRA 87 legislation, while implementing significant changes, did not address the problem of dumping of Medicaid residents, whose care is reimbursed at a relatively low rate, by nursing homes. For example, in 1998, Vencor Inc. attempted to dump Medicaid patients at a Florida nursing home, and, in other states, the chain was getting rid of Medicaid residents by withdrawing from the Medicaid program entirely (Peterson and Soteropoulos 1999). As a result of such events, in March 1999, President Clinton signed a bill into law banning the dumping of Medicaid patients by nursing homes.

Payment for Nursing Home Services

Given that nursing home care is a combination of health care delivery, room, and board, it's funding differs from funding of other types of health related services. While methods of payment for nursing home services have changed considerably over time, in nursing homes today there are only three major payer types: private-pay, Medicaid funded, and Medicare funded. Private-pay residents or their families pay for nursing home expenses without any government assistance. The Medicaid program covers long-term care for the poor, where Medicaid residents must meet the eligibility standards set forth by the Social Security Administration. In Florida, individuals who are eligible for Medicaid reimbursement of nursing home care must have a monthly income level that does not exceed 300 percent of the basic SSI cash welfare payment.[1] Under the Medicaid program, a nursing home is reimbursed per day for each Medicaid funded resident. The rate at which the facility is paid is set prospectively, or prior to the period in which the nursing home resident stay day takes place. The rate establishment process for each facility takes place as follows: each nursing home submits a cost report to the state, where the state uses the report to establish a facility specific daily rate in advance twice a year. Nursing homes are paid the same daily reimbursement rate for each Medicaid funded resident, regardless of the disability level of the resident.

The third major payer for nursing home care is the Medicare program, a federal program that funds medical care for the elderly and pays for convalescent or terminal, not long-term, skilled nursing facility care.[2] Medicare nursing home coverage is currently limited to 100 days, and it requires prior hospitalization and a physician established need for skilled nursing services. In essence, during the period considered, nursing homes submit cost reports to the Medicare program, and they are reimbursed for all covered costs.[3] While Medicare pays for all care for the first twenty days of a qualifying skilled nursing facility stay, it requires a co-payment, which is generally paid with private or Medicaid dollars. In 1987, the Medicare per diem co-payment for days 21-100 of a nursing home stay was $65. By 1996, the Medicare co-payment was $78.50, or approximately $55 in 1986 dollars. [4]

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[1] In Florida in 1997, the average monthly SSI payment was $327.64. Social Security Bulletin: Annual Statistical Supplement (Washington, DC: Social Security Administration, 1998), Table 7.B3.

[2] The terms "nursing home" and "skilled nursing facility" are used interchangeably in the remainder of the dissertation.

[3] Medicare began its transition to prospective payment for skilled nursing facilities on July 1, 1998. The new program is scheduled to be phased in over a three year period.

[4] The proportion of nursing home revenues obtained from private-pay nursing home residents is approximately equal to the proportion of all nursing homes days utilized by private-pay residents. In contrast, the proportion of revenue from Medicaid residents is less than their proportionate presence in the nursing home, and Medicare residents provide more than their proportionate share of revenue.

Excess Demand and Access for Medicaid Patients

Given that a large portion of nursing home care is paid for by the government and given lower reimbursement rates for Medicaid funded residents in many states, several authors have examined whether there is excess demand for nursing home care. In his seminal paper, Scanlon's (1980) model of nursing home behavior depicts nursing homes as facing a downward sloping demand curve for private-pay patients, where the demand curve is horizontal at the governmentally established Medicaid reimbursement rate. While a more complete graphical exposition will be presented later in the dissertation, it is important to note that excess demand for nursing home beds will exist if the Medicaid reimbursement rate is not set high enough to clear the Medicaid portion of the market. Scanlon test for and finds excess demand for nursing home care using aggregate data.

Since Scanlon's study, several authors have reexamined the issue of excess demand and the effect of excess demand on potential nursing home residents who are funded by Medicaid.[5] Using 1983 county-level data from Wisconsin, Nyman (1989) concludes that Medicaid residents are "crowded out" when the nursing home bed supply is restricted. Furthermore, Cutler and Sheiner (1996) find that in states with larger underpayments, the poor suffer reduced access. However, it appears that the problem of access is less of an issue in more competitive markets. For example, Ettner (1993) examines the access issue by considering waitlisting of potential nursing home residents. She finds that a greater bed supply is associated with less waitlisting for individuals on Medicaid. Along similar lines, Hoerger, Picone, and Sloan (1996) determine that increasing the number of beds per elderly in the market increases the probability that an individual enters the nursing home, and Gertler (1992) concludes that Medicaid patient access is lower in more competitive markets. In addition, pointing a finger directly at price regulators, Cutler and Sheiner (1996) conclude that the Medicaid underpayment rate is negatively and statistically significantly related to nursing home use, where the poor elderly (who are often funded by Medicaid) suffer the most.

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[5] Legal restrictions may prevent some access barriers faced by Medicaid funded potential nursing home residents. For example, skilled nursing facilities are prohibited under federal law from requiring patients to waive their rights to Medicaid benefits or to give oral or written assurances that they will not apply for such benefits (42 United States Code Annotated 1395:3). In addition, "private-pay duration of stay" contracts, in which the resident must agree to pay the private rate for a given period of time before applying for Medicaid, are illegal.

While price regulation through government establishment of Medicaid reimbursement rates is sufficient to create excess demand, the Certificate-of-Need (CON) program may also be responsible for excess demand in the nursing home industry. In Florida, before an individual or corporate entity may be granted a license by the state to operate a nursing home, hospital, home health agency, intermediate care facility, or hospice, the person must apply to the state's Agency for Health Care Administration (AHCA) and must be awarded a certificate that indicates the state's recognition of a need for such a health care facility or service in a market area, where the certificate is called a Certificate-of-Need. CON regulation in Florida began in the early 1970s as a result of federal legislation, which was intended to curb rapidly escalating health care costs. The federal CON program was repealed in 1981, but Florida's CON program for nursing homes remains in effect. The state's CON program is centered around three stated policy goals: cost containment of overall health care expenditures, ensuring a minimum level of quality of health care, and ensuring access to health care goods and services.

States may choose to use CON laws, and not some other mechanism, to limit expenditures on nursing home care because CON regulation is a subtle, less visible form of expenditure limitation than explicitly setting spending caps or limits on the number of Medicaid funded beds (Feder and Scanlon 1980). Feder and Scanlon (1980), who examine CON programs in eight states, argue that the state determined "need" for nursing home beds may have little to do with the number of persons who actually seek nursing home care. They also found that, in every state examined, nursing home operators recognized the advantages to the nursing home industry of restricting entry through CONs. CONs may serve as a mechanism to establish and preserve market power. Thus, CON regulation may create a barrier to entry that could limit both the number of firms in the market and eliminate the contestability of the market by potential firms (Nyman 1994). As Vogel (1983) argues, apparently, "The monopoly power CON restrictions create is apparently far more valuable to those operators than [the expected value of] any new investment they might forgo." Clearly, as Nyman (1985) asserts, excess demand "destroys excess capacity as a costless signal of quality."

In terms of incorporating the effect of CON programs into models of nursing home behavior, Gertler (1985) was one of the first authors to include a capacity constraint in his model. He shows that the effect of the CON capacity constraint (as measured by the market concentration measure) on quality is negative but that the constraint has an ambiguous effect on the private-pay price.[6] Gertler concludes that entry causes for-profit homes to raise quality, raise the private-pay price, and to substitute Medicaid for private-pay patients. Similarly, in a series of studies, Nyman (1985, 1988a, 1988b) finds that excess demand, possibly resulting from CON programs, leads to decreased nursing home quality and a smaller proportion of Medicaid residents in nursing homes. In contrast, using the number of years that a state has had a CON program as the measure of CON restrictiveness in the county, Gulley and Santerre (1997) determine that CON laws were not very successful in decreasing the provision of nursing home services at the county level.

Market Definition and Substitutes for Nursing Home Care

When looking at the issue of competition among nursing homes, both the market area definition and the degree of available substitutes must be considered. Beginning with the market area definition, many authors (Ettner 1993; Gertler 1985; Gulley and Santerre 1997; Nyman 1989; and Zinn 1994) have used the county as the appropriate market area for the nursing home. In their 1987 paper, Garnick, Luft, Robinson, and Tetreault provide a thorough examination of measures of hospital market areas. They argue that practicality and comparability are the key advantages of using the county or Standard Metropolitan Statistical Area as the appropriate market area. One problem with using such geopolitical boundaries is that the county or SMSA may be too small to capture all nursing homes in a market. Likewise, the market may be too big, including nursing homes that are not in the same market.

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[6] In his essay, the CON capacity constraint on an individual nursing home is measured as the average daily census of patients in the home. In contrast, CON entry policy is captured by the Herfindahl-Hirschman

The argument for use of the county as a measure of the market area is supported by the Day (1972) study of Delaware nursing homes, where Day found that five out of six nursing home residents were housed in facilities less than 25 miles from their community home. Likewise, using New York State's 1980 survey of Long Term Care Facilities, Gertler (1989a) found that 75 percent of patients residing in nursing facilities had previously lived in the same county. However, given that county sizes vary across states, it is not clear that these results apply to Florida. Nevertheless, following Swan and Benjamin (1990), who argue that, for the long-term market, the county may be a reasonable measure of the market area given patterns of funding and patient origin for nursing home residents, the county is utilized as the market area.

Turning to the issue of substitutes, both home health agencies and support from children may reduce the demand for skilled nursing facility services by serving as substitutes for nursing home care. In one of the first studies of nursing home demand, Chiswick (1976) found that per capita demand for nursing home care is increasing in the labor force participation rate of women. Likewise, both Reschovsky (1996) and Swan and Benjamin (1990) determine that home health services and informal caregiving facilitate independent living in the community. Finally, individual data from the National Long-Term Care Survey reveals that the marginal source of community care for the

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Index (HHI) of the concentration of each home's private-pay market. For a description of the properties of institutionalized elderly appears to be support from children or other helpers (Cutler and Sheiner 1996). In contrast, Gulley and Santerre (1997) conclude that the female labor force participation rate is not an important determinant of the provision of the total number of nursing home residents per elderly capita in the county, and Wolf and Soldo (1994) find no evidence of reduced propensities to be employed or of reduced conditional hours of work due to the provision of parent care.

Quality

When considering the economics of health services, the issue of quality is not easily ignored. What is quality with respect to nursing home care? Davis (1991) argues that nursing home quality is a value-based construct, where preferences of policymakers, health care professionals, administrators, owners, investors, third-party insurers, and consumers must all be considered. Donabedian (1980, 1982) has specified three categories of quality assessment: structure, process, and outcome. Structural measures of quality involve inputs to the production of quality. For example, staff-to-patient ratios and physical characteristics of the facility are often cited as structural quality inputs used in the production of medical care. In contrast, process measures of quality focus on the delivery of services, i.e. health care practices. Examples of such measures in the nursing home literature include meal ratings, dietary plans, nursing services, and care plans. In practice, the line between structure and process measures is not clear. However, the link

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the HHI and other measures of market concentration, see Scherer (1980).

between process and outcomes for nursing home residents is likely to be stronger than the link between structural measures and outcomes. In other words, health care practices are more closely tied to patient outcomes than inputs.

In the health care literature, outcome is generally considered the most appropriate quality measure, as it represents the actual impact on the patient's well being. However, in nursing homes, morbidity and impairment already exist and usually cannot be "cured" (Davis 1991). Outcome measures include direct observations of residents' physical, mental, and emotional conditions and include discharge and survival rates.

Relationships between structural, process, and outcome measures of quality in the nursing home have been explored by several authors. For example, Linn, Gurel, and Linn (1977) determine that homes with more registered nurse hours per patient were associated with patients being alive, improved, and discharged from the nursing home. Along similar lines, Cohen and Spector (1996) determine that a higher registered nurse (RN) intensity level is associated with a lower rate of mortality among nursing home residents, and Monroe (1990) finds that increasing the ratio of RNs to licensed vocational nurses (LVNs) decreases the number of inspection deficiencies. In contrast, Braun's (1991) examination of the effect of nursing home quality on patient outcome concludes that increasing RN hours in the nursing home increased the probability of dying in the nursing home.

Two key measures of quality are utilized in the empirical work in this dissertation: nurse hours per resident per day and the number of inspection violations, i.e. deficiencies, per resident per day. Nyman (1985, 1989) uses violations of licensing laws as a proxy for quality. Braun (1991), Davis (1991), Kooreman (1994), Monroe (1990), and Zinn (1994) use registered nursing hours as measures of quality. Zinn also uses the proportion of residents not toileted, the prevalence of urethral catheterization, and the prevalence of physical restraint usage as process measures of quality.

Nyman (1988a) and Riportella-Muller and Slesinger (1982) both conclude that inspection violations and consumer complaints occur more frequently in larger homes. This is to be expected given that more residents create more opportunities to discover problems related to resident care, i.e. more instances in which rules are violated. Thus, per capita measures of the quality variables are used.

In the dissertation, the impact of quality in a given nursing home on nursing home payer-mix is considered. This issue has been considered to some degree by other authors. For example, Gertler (1992) determines that lower quality reduces private-pay demand and increases the number of Medicaid patients admitted, and Nyman (1985, 1988a) concludes that having more private-pay residents in a nursing home is associated with decreased inspection deficiencies. However, McKay (1989), using inputs as the measure of quality, finds that private-pay and Medicaid patients in the same facility receive the same quality of care. Turning to other studies using staffing measures of quality, Fottler, Smith, and James (1981) show that an increase in the staff to patient ratio or in the number of nurse hours in the nursing home decreases the proportion of Medicaid residents in the nursing home. Likewise, Zinn (1994) finds that the proportion of Medicaid funded residents in a nursing home is negatively related to the number of RNs per resident.

Costs

In addition to affecting a nursing home's payer-mix, quality is likely to impact nursing home costs. Prior to work by McKay (1989), authors of nursing home cost studies estimated the effect of a multitude of factors on nursing home costs, including quality. McKay, in contrast, uses a translog cost function, where total costs are a function of input prices and outputs. This form is consistent with theoretical models of firm costs and avoids placing prior restrictions of the production function. Other authors that have used the translog for nursing home and hospital cost function estimation include Conrad and Strauss (1983), Fournier and Mitchell (1992), Gertler and Waldman (1992), and Vita (1990). McKay's cost function estimates include a control for quality, nurse hours per patient day. In contrast, Gertler and Waldman use a latent variable model to control for quality in the cost function estimates.

Several authors have examined the relationship between costs and control variables such as quality and ownership type. While higher-cost-higher-input-quality relationships are expected given that costs are based in part on input information, the effect of ownership type, i.e. for-profit, non-profit, or government owned, is not clear. If government owned and non-profit homes are profit-maximizers, one would expect to find no effect. However, this may not be the case. In terms of quality, when bed supply is restricted, Nyman (1988b) finds that increasing the number of inspection violations increases costs. Turning to the issue of ownership, Nyman finds a pattern of lower expenditures in for-profit homes. However, the cost differences may reflect differences in efficiency or quality. In an earlier study, Nyman (1985) concludes that for-profit nursing homes have higher quality than non-profit nursing homes. Likewise, Gertler (1992) finds that non-profit nursing homes have costs that are about eleven percent higher than proprietary homes.

The focal issues related to nursing home costs to be studied in this dissertation are cross-subsidization among nursing home residents and the impact of regulatory measures on costs. Including control variables representing regulatory measures into the cost function allows for examination of the second issue. Cost function estimates also allow one to determine the average incremental costs of caring for Medicaid funded, private-pay, and Medicare funded nursing home residents. By comparing the average incremental cost for each patient type with the daily rates paid by those residents, an examination of the issue of cross-subsidization among payers is possible. While Little (1992) has examined cost shifting in nursing homes using aggregate data, to my knowledge, there have been no other studies of cross-subsidization in nursing homes. However, other authors have examined the cost shifting phenomenon in health-related industries. For example, Dranove (1988) determined that Illinois hospitals "cost shifted," i.e. raised the price to private-paying patients in response to substantial reductions in Medicaid payments in the early 1980s. He also found that hospitals did not fully pass on cost increases to private-pay patients.

Given the literature on key aspects of the nursing home industry, a model of nursing home behavior is formulated to motivate the empirical work in subsequent chapters.

Model of Nursing Home Behavior

A model of nursing home care demand was first presented by Chiswick in 1976. Using the Standard Metropolitan Statistical Area (SMSA) as the unit of observation, he considers nursing home utilization through equations for the industry price and the population's demand for nursing home services. Building significantly on Chiswick's work, Scanlon (1980) describes the market for nursing home care and reviews the determinants of demand while also examining supplier behavior. In his work, Scanlon examines how government policies may contribute to the creation and persistence of excess demand in the market for skilled nursing facility services. Since Scanlon's work, several authors (Copeland 1997; Cotterill 1983; Gertler 1985, 1989b; and Nyman 1985, 1989) have expanded upon and modified the basic profit maximization model in his paper.

To motivate the empirical estimation of the relationship between quality, payment rates, and patient mix, a model of nursing home demand is formulated in the spirit of Scanlon (1980), Nyman (1985, 1989), and Copeland (1997). In their models, skilled nursing facility residents are segmented into two groups: private-pay patients and Medicaid funded patients. The designation of only two groups of payer types is based upon the empirical observation that Medicare patients have historically constituted a relatively small portion of the total population of nursing home residents and have provided a small portion of nursing home revenues. In 1987, for example, Medicare patients made up two percent of Florida's nursing home population and accounted for less than four percent of nursing home revenues. However, by 1996, Medicare patients constituted almost twenty percent of the nursing home population and provided nearly 36 percent of total revenue. Given this trend, the model that follows includes three groups of patients: Medicare funded, Medicaid funded, and private-pay.

In this model, the nursing home operates as a monopolistically competitive firm. The nursing home faces demand for its product from the three groups of payer types outlined above: private-pay, Medicaid funded, and Medicare funded. The demand for the three groups, respectively, is as follows:

$$X_P=X_P(P, Q, Z) \tag{1}$$

$$X_{MD}=X_{MD}(Q, Z) \tag{2}$$

$$X_{MR}=X_{MR}(Q, Z) \tag{3}$$

where P is the private-pay nursing home resident's price, Q is the quality of the nursing home, and Z is a vector of exogenous demand shifters. X characterizes the sum of the demand from all payer types: X_P, X_{MD}, and X_{MR}. Following Nyman (1989), the demand for nursing home care is assumed to be made either by the resident or by an agent of the resident concerned with maximizing the utility of the resident, such as a family member.[7]

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[7] By estimating a demand function for private nursing home residents, Nyman examines whether nursing home residents respond reasonably to differences in prices and quality across nursing homes. His

By assumption, the elements of the vector Z are the same for each demand function, and all nursing home residents within the same home receive the same level of quality, irrespective of payer type.[8]

The costs faced by the nursing home depend upon the level of output, the level of quality provided by the firm, and on a vector of exogenous cost shifters, W. The total cost function is as follows:

$$C=C(X, Q, W) \tag{4}$$

where $X=(X_P, X_{MD}, X_{MR})$. For all X, the following conditions are assumed to hold: $\partial C/\partial X>0$, $\partial C/\partial Q>0$, $\partial^2C/\partial X^2\geq 0$, and $\partial^2C/\partial Q^2\geq 0$. In words, costs are increasing and increasing at an increasing rate in output and the level of quality.

Each nursing home solves the following profit maximization problem by choosing P, the private-pay price, and Q, the level of quality:[9]

$$\text{Max } \pi=PX_P(P, Q, Z) + R_{MD}X_{MD}(Q, Z) + R_{MR}X_{MR}(Q, Z) - C(X, Q, W) \tag{5}$$

$$\text{s.t. } X_P + X_{MD} + X_{MR} \leq K \tag{6}$$

where R_{MD} is the Medicaid reimbursement rate, R_{MR} is the Medicare reimbursement rate, and K is the state-imposed capacity constraint. The capacity constraint is a result of the state run CON program, which requires nursing home owners and potential owners to obtain state approval for new construction and for the addition of nursing home beds in a

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regression results reveal that consumers respond systematically to differences in price and quality, which leads him to conclude that consumers of nursing home care behave rationally.

[8] This assumption is supported by the empirical work of McKay (1989), and it will be tested directly later in the paper.

[9] Both non-profit and for-profit nursing homes are assumed to maximize profits. While contrary to anecdotal evidence about non-profits, the non-profit skilled nursing facility that wishes to redistribute profits toward favored causes still has an incentive to maximize profits.

home. The application process takes approximately four years, and a significant number of requests are denied. As discussed above, many authors have determined the existence of excess demand for nursing home care. Excess demand implies that the CON capacity constraint is binding (Gertler 1992).

It is important to note that Medicare only funds a maximum of 100 days of nursing home care. Of that 100 days, Medicare fully funds days 1-20 but requires a copayment for days 21-100. For days 21-100, two-thirds of elderly, who are covered by Medigap policies, pay for little or none of the copayment during days 21-100 (Garber and MaCurdy 1991). One-third of nursing home residents bear the entire copayment out-of-pocket unless they are also enrolled in Medicaid. Thus, one might also choose to characterize Medicare funded days 21-100 as being a function of private-pay price. However, given that Medicare covered nursing home stays are largely paid for by the Medicare program, Medigap, and Medicaid, Medicare demand is modeled as a function of only quality and exogenous demand shifters.

The first order conditions, where λ is the Lagrangian multiplier or shadow price of capacity, are as follows:

$$\frac{\partial \pi}{\partial P} = X_P + P\frac{\partial X_P}{\partial P} - \frac{\partial C}{\partial X_P}\frac{\partial X_P}{\partial P} - \lambda\frac{\partial X_P}{\partial P} = 0 \tag{7}$$

$$\frac{\partial \pi}{\partial Q} = P\frac{\partial X_P}{\partial Q} + R_{MD}\frac{\partial X_{MD}}{\partial Q} + R_{MR}\frac{\partial X_{MR}}{\partial Q} - \left(\frac{\partial C}{\partial Q} + \frac{\partial C}{\partial X_P}\frac{\partial X_P}{\partial Q} + \frac{\partial C}{\partial X_{MD}}\frac{\partial X_{MD}}{\partial Q} + \frac{\partial C}{\partial X_{MR}}\frac{\partial X_{MR}}{\partial Q}\right) - \lambda\left(\frac{\partial X_P}{\partial Q} + \frac{\partial X_{MD}}{\partial Q} + \frac{\partial X_{MR}}{\partial Q}\right) = 0 \tag{8}$$

$$\frac{\partial \pi}{\partial \lambda} = K - X_P - X_{MD} - X_{MR} = 0 \qquad (9).$$

One important issue is the effect of changes in Medicaid or Medicare reimbursement rates on nursing homes' choice of quality, Q. The effect of a change in the Medicaid reimbursement rate, R_{MD}, on quality is as follows:

$$\frac{dQ}{dR_{MD}} = \left[2\frac{\partial X_P}{\partial P}\frac{\partial X_{MD}}{\partial Q}\right] / |J| \qquad (10)$$

where | J | is the second order Hessian matrix determinant. For profit maximization, | J | must be positive. This result is found by taking the total differentials of the implicit function version of the first order conditions on P, Q, and λ, represented by $\underline{P}$, $\underline{Q}$ and $\underline{\lambda}$, respectively. Then the total differentials are arranged such that the terms involving $d\underline{P}$, $d\underline{Q}$, and $d\underline{\lambda}$ appear on the left hand side. When only R_{MD} is allowed to vary, the system of equations may be written in matrix form as follows:

$$[Z]\begin{bmatrix} \partial \underline{P}/\partial R_{MD} \\ \partial \underline{Q}/\partial R_{MD} \\ \partial \underline{\lambda}/\partial R_{MD} \end{bmatrix} = \begin{bmatrix} \partial \pi_{\underline{P}}/\partial R_{MD} \\ \partial \pi_{\underline{Q}}/\partial R_{MD} \\ \partial \pi_{\underline{\lambda}}/\partial R_{MD} \end{bmatrix} \qquad (11)$$

where [Z] is the array of the coefficients of the choice variable differentials. Next, the comparative statics in this case can be found using Cramer's rule.

Examining the numerator in (10), $\frac{\partial X_P}{\partial P}$ is negative given that increases in the private-pay price will decrease the number of private-pay residents in the nursing home. The second term, $\frac{\partial X_{MD}}{\partial Q}$, is positive if Medicaid residents respond positively to increases in quality. Thus, $\frac{dQ}{dR_{MD}}$ is negative. In other words, increasing the Medicaid reimbursement rate causes nursing home quality to increase when Medicaid residents respond positively to increases in quality. It is easy to show that $\frac{dQ}{dR_{MR}}$ is also negative. However, at this level of generality, it is not possible to determine qualitatively how a change in an exogenous variable that affects one payer type at the expense of the other, ceteris paribus, will affect the optimal choice of quality. Thus, an empirical investigation is in order.

In the first empirical essay, an investigation of the issue of cross-subsidization among the three types of residents outlined above is conducted. As part of this investigation, a generalized translog cost function is specified, where the generalized translog is consistent with theoretical models of firm costs and avoids placing prior restrictions of the production function. Recall from the model above that nursing home costs are a function of the level of output, the level of quality provided by the firm, and a vector of exogenous cost shifters.

In this specification of the cost function, the following outputs are used: Medicaid resident days per year, Medicare resident days per year, and private-pay resident days per year. Several specifications of the cost function are estimated using different measures of quality: registered nurse hours per patient day, all nurse hours per patient day, and the number of inspection violations found per resident day. The list of exogenous cost shifters includes, but is not limited to, the following: input prices, the overall disability level of the nursing home population, and the nursing home's ownership type. In the second empirical essay, a series of interaction variables in the vector of exogenous cost shifters are included to allow for an investigation of the effect of regulatory measures on costs.

Like costs, the issue of quality is considered in both empirical essays. As is evident from the first order conditions, quality, Q, affects nursing home profits through a variety of mechanisms. In the empirical estimation, quality is a function of the proportion of Medicaid and Medicare patients in the nursing home, as well as other factors, including regulatory changes.

Returning to the first empirical essay, which examines the issue of cross-subsidization in nursing homes, the effect of the difference between the private-pay price, P, and the Medicaid reimbursement rate, R_{MD}, on the proportion of Medicaid residents in the nursing home, $X_{MD} / (X_P + X_{MD} + X_{MR})$, is considered. If cross-subsidization is occurring, when there is a greater proportion of Medicaid patients in a home, ceteris paribus, the subsidy must be greater to cover the costs of Medicaid patient care.

Finally, of particular interest in the nursing home literature is the issue of access for Medicaid residents when supply is restricted. Thus, in the second essay, estimates of the proportion of Medicaid residents in the home are conducted. Following the model presented above, the number of Medicaid residents depends upon nursing home quality and a vector of exogenous demand shifters, where the proportion of Medicaid residents is determined by the firm's choice of quality and the private-pay price. Thus, the proportion of Medicaid residents in a nursing home is a function of quality (as measured by registered nurse hours or inspection violations per patient day) as well as per capita income, the proportion of elderly in the community receiving Supplemental Security Income, the nursing home's ownership type, and other factors.

More detail regarding the empirical specification of the relationships between nursing home costs, nursing home quality, the proportion of Medicaid residents in the nursing home, cross-subsidization, and regulation is provided in the essays that follow.

CHAPTER 2

COST SHIFTING IN NURSING HOMES: EXPLAINING RATE DIFFERENTIALS AMONG PAYER TYPES

Introduction to Cross-Subsidization in Nursing Homes

Since over half of all nursing home resident days are funded by Medicaid, one critical issue facing policy makers and voters is the appropriate funding for Medicaid patients and the associated implications for quality of care. Nursing home owners have long insisted that the Medicaid program does not reimburse them enough to cover the costs of providing quality care to Medicaid funded patients. However, it is not clear whether nursing home owners are actually losing money on Medicaid residents. Thus, one question concerning funding of nursing home care that is often posed is as follows: do states currently pay nursing homes enough to cover the costs of Medicaid patients, or are Medicaid patients being subsidized by other residents in nursing homes?

Under standard profit-maximization conditions, a firm that sells health care services to two groups of patients will *not* raise the price of care to one group of patients in response to a price cut from the second group of patients. In other words, if the Medicaid reimbursement rate is decreased, firms will attempt to shift capacity from the lower paying Medicaid group to the higher paying self-pay group. However, increasing sales to self-pay patients in a monopolistically competitive market requires that the price charged to self-pay patients be *decreased.* Thus, one must look beyond simple profit-maximization arguments to determine why nursing homes might cross-subsidize.

Why might nursing homes cross-subsidize across patient types? There are at least two possible explanations for why profit-maximizing owners cross-subsidize. First, there may be considerable uncertainty with respect to whether a nursing home resident is going to convert to Medicaid. Thus, nursing homes may accept self-pay or Medicare patients without complete knowledge as to how the individual's care will be funded for the duration of the individual's stay. In other words, the nursing homes may face an explicit obligation to continue to provide unremunerative services to a resident that converts to Medicaid after entering the nursing home.

While state and federal laws have long existed to protect people from being evicted when they convert to Medicaid, many residents do not understand the laws.[10] Regulations state that residents can only be forced to leave under specific circumstances: when the facility cannot meet the resident's needs, when the resident is in danger, when the resident poses a threat to other residents, when the resident is well enough to leave the home, or when the resident has failed to pay for nursing home services. In addition, residents facing a discharge must be given a written notice thirty days in advance of the discharge, where the notice must contain information about how to file an appeal. Thus, nursing homes have an explicit obligation to care for nursing home residents when they convert to Medicaid. Given this obligation, nursing homes may be forced to subsidize care for Medicaid residents given that they cannot refuse to care for them at the lower rate.

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[10] The exception to this statement are nursing homes that refuse to participate in the Medicaid program entirely. If a nursing home does not permit Medicaid payment, the fact must be made clear to prospective residents.

Second, nursing homes may subsidize Medicaid residents as a means of "buying" favors from regulators, such as Certificate-of-Need (CON) approvals. Through the CON program, the state has developed a mechanism to ensure access for some Medicaid eligible nursing home residents. Under Florida statute, AHCA is given that authority to impose a condition on a legal person applying for a CON for nursing home beds to certify a specified number or percentage of those beds for use by Medicaid recipients. If a nursing home agrees to such a condition, the condition may act as an explicit contract with regulators where cross-subsidization is required. Nursing homes may also establish an implicit contract with regulators, where nursing home owners consistently accept a proportion of Medicaid patients in return for market power, granted in the form of higher levels of CON denials to other operators or potential operators in the market.

Static cost shifting, or third degree price discrimination, may be differentiated from cross-subsidization. Under cross-subsidization, a payer type, such as Medicaid funded, within the nursing home is not paying enough to cover the incremental costs of care for that payer type. Thus, the price charged to another payer type must be higher than the socially optimal price to subsidize the care of Medicaid residents. This definition of cross-subsidization is similar to one employed by Sloan and Becker (1984), who argue that cost shifting occurs if reductions in the government payment rate lead to increases in the prices charged to private-pay patients. One possible test for cross-subsidization would be to require that a service be priced no lower than marginal cost to avoid subsidy. Generally, however, this test is not employed given that a service that is priced to pass the marginal cost test may not even generate revenues sufficient to cover the costs directly attributable to the service. In contrast, under third degree price discrimination, all residents pay a price that is greater than or equal to the marginal cost of care. Incremental cost test for cross-subsidy are presented later in this chapter.

Only three things are required to successfully implement third degree price discrimination, or static cost shifting. First, the nursing home must have market power, i.e. the ability to profit from setting the price for resident days above the competitive level. Second, the nursing home must be able to keep Medicaid residents from selling their patient days to other residents. Finally, payer groups must be identifiable and have differing degrees of sensitivity to price. The last two conditions are easily met in the nursing home industry. The first condition is likely to hold given family preferences for a skilled nursing facility located close to the family's home and given the CON program for regulating new skilled nursing facility construction and bed addition in existing homes.

By limiting the number of available beds through the use of the CON policies, the state can limit the available beds to Medicaid funded patients and control costs. Given that moral hazard problems are likely to exist with respect to publicly provided nursing home care, such cost control mechanisms may serve to eliminate from the Medicaid rolls patients with other options, such as informal care by children. Recall that moral hazard occurs when there is asymmetric information after a transaction occurs. For example, one sees moral hazard problems when insurance coverage affects individuals' decisions to undertake activities that may change the likelihood of incurring losses. Medicaid funded skilled nursing facility coverage can be viewed as a type of insurance against having homeless, ailing elderly. Given the existence of the program, an individual is likely to invest less in "insurance" against being homeless and unable to care for one's self. Thus, Medicaid funding of nursing home beds is likely to discourage private saving for long-term care and private long-term care insurance.

In the same manner, family members will be more likely to consider nursing home care as a viable alternative given that they do not incur the full costs of such care, while they generally do incur the full costs of caring for an elderly family member at home. Approximately five percent of elderly are institutionalized at any point in time. In addition, among those 85 years and older, only 25 percent are institutionalized at any given point in time (Cutler and Sheiner 1996). The small size of the formal long-term care sector magnifies the moral hazard problem in the following manner: substitution to formal long-term care by even a small portion of individuals being cared for informally could result in a large increase in long-term care demand.

As the above discussion suggests, CON policies may be used as a tool by the state to control Medicaid nursing home outlays. However, restricting the nursing home bed supply is likely to have detrimental effects on welfare by creating an inordinate level of market power for some nursing homes. In sum, CON policies may limit competition in nursing home markets, which may decrease public welfare by allowing nursing homes to charge above competitive prices to private-pay patients, allowing for cross-subsidization by profit-maximizing firms to occur.

Graphical Depiction of Nursing Home Demand

To frame the issue of cost shifting among residents in nursing homes, a graphical exposition of the demand for nursing home care is useful. For ease of exposition, quality is assumed constant across homes. Figure One shows the demand and cost situation of a profit maximizing home in the short run, where there are only private-pay nursing home residents in the market. The output of the profit maximizing firm is shown as $X_{Private}$ and the price is shown as $P_{Private}$. Since profit maximizing behavior requires the equalizing of marginal cost and marginal revenue by the firm, the ultimate price and quantity effects of changes in demand or cost will depend on the shifts in demand and cost curves in relation to each other.

Figure Two shows the short-run profit maximizing situation for a proprietary nursing home "selling" care to the government, which pays for nursing home care through the Medicaid program. This facility has no private-pay patients. Again, under profit maximization behavior, the firm equates marginal revenue with marginal cost and chooses to produce $X_{Medicaid}$. The demand curve, in this case, is perfectly elastic and represents the government's willingness to pay for an unlimited amount of care at the Medicaid reimbursement rate ($P_{Medicaid}$).

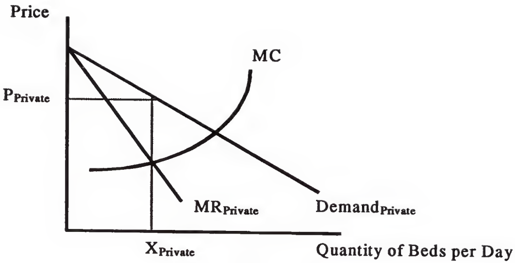

Figure One: Private-Pay Demand

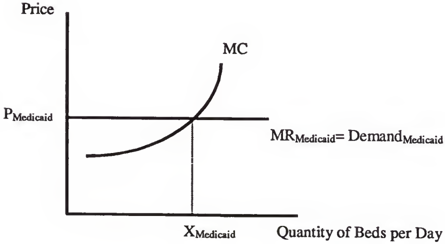

Figure Two: Medicaid Demand

Figure Three also depicts a nursing home selling care only to the government. However, the sole government payer in this case is the relatively generous Medicare program. Once again, the firm will attempt to equate marginal revenue with marginal cost and will produce $X_{Medicare}$. As in Figure Two, the demand cure is perfectly elastic at the governmentally established reimbursement rate ($P_{Medicare}$). In Figure Three, it is assumed that the firm will be able to accept the optimal number of Medicare patients, i.e. that there will be at least $X_{Medicare}$ Medicare-eligible residents in the market. However, the number of potential Medicare residents is restricted by two factors: the strict eligibility requirements for Medicare funding of nursing home care and the 100 day time limit on the Medicare nursing home benefit period. Thus, firms are likely to find themselves facing a restricted supply of Medicare funded potential residents, where they would be forced to produce less than $X_{Medicare}$ resident days. In contrast, the Medicaid program, as depicted in Figure Two, requires only that the elderly meet an income requirement to be eligible for Medicaid, making the supply of these patients larger.

Finally, Figure Four illustrates a scenario in which a profit maximizing facility faces a combined private-pay, Medicaid, and Medicare market. Under this situation, the public prices are fixed by the government and the private-pay price is set by the market. The federal government determines the more generous Medicare price, and state regulators set the less generous Medicaid reimbursement rate. Thus, the nursing home faces three demand curves, where two are perfectly elastic. In such a case, we would expect the provider to adjust prices and quantities produced to maximize profits by

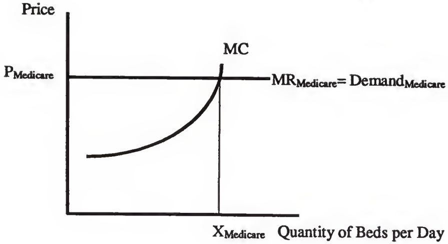

Figure Three: Medicare Demand

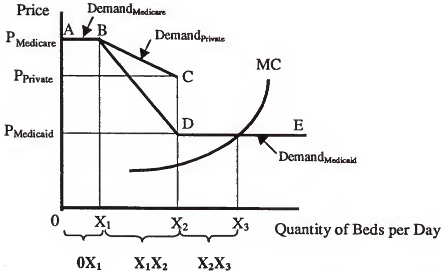

Figure Four: Demand for Private-Pay, Medicaid, Medicare

equalizing the level of marginal revenue (and of marginal cost) in the three markets. If there were an unlimited supply of Medicare residents, the nursing home would choose to charge the profit-maximizing price for private-pay patients and fill the remaining beds with Medicare residents. However, as discussed above, the supply of Medicare residents is likely to be limited. In Figure Four, the supply of Medicare residents is assumed to be limited to X_1 Medicare residents. Given the marginal cost curve in Figure Four, the firm will produce X_3 nursing home beds per day, allocating $0X_1$ to the Medicare market, X_1X_2 to the private-pay market, and X_2X_3 to the Medicaid market. The price in the Medicare market will be $P_{Medicare}$, the price in the private market will be $P_{Private}$, and the price in the Medicaid market will be $P_{Medicaid}$.

Following a discussion of the data and institutional factors, the issue of empirical tests for cross-subsidization in nursing home care will be discussed.

Data Description and Institutional Factors

Data for the empirical analysis was collected from a variety of sources. From Florida's Agency for Health Care Administration (AHCA), data was obtained on skilled nursing facility residents, nursing home financial data, and Medicaid nursing home reimbursement data. Under a dissertation grant from the Health Care Financing Administration, two types of skilled nursing facility inspection data, Provider of Services and Online Survey Certification and Reporting (OSCAR) System data, were provided by the agency. For demographic variables, the Florida Statistical Abstract, the Florida

Health Care Atlas, the County and City Data Book, and the U.S. Census file STF3A were consulted. Data elements were gathered for each year, where available, for the period 1986-1996. For a complete discussion of data sources, see Appendix A.

Limitations on the number of years of data available for key data elements mean that, generally, four consecutive years of data are available for each nursing home. However, measurement error may be a significant problem for the inspection data given the subjective nature of the inspection process. Furthermore, the annually submitted nursing home cost report may contain accounting related corrections from year to year that call into question the accuracy of any individual report in depicting costs. In an effort to compensate for year to year measurement error, after deleting observations containing obvious typographical errors, the four-year average of all variables used in the analysis was taken.[11]

To understand the issue of cross-subsidization, which involves setting rates above competitive levels for some residents so that other residents may pay less, it is important to understand how Medicaid reimbursement rates are set for nursing homes in Florida. Medicaid reimbursement rates in Florida are prospective, meaning that the rates are established in advance for a defined period. During the period, a nursing home is paid at that rate regardless of the costs it actually incurs. Prospective payment systems for Medicaid providers have been implemented in many states in an effort to introduce a degree of constraint on cost increases by setting limits on amounts to be paid during a future period. Prospective payments to skilled nursing facilities differ from prospective payments made to hospitals. Hospitals are paid a fixed rate per admission, not per day, that is based on the patient's diagnoses. In contrast, over the period that examined in this study, nursing homes in Florida are paid a fixed rate per patient per day that is not a function of length of stay or diagnoses.

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[11] All variables expressed in dollar terms have been deflated to 1986 levels using the Consumer Price Index. When conducting empirical estimates using the non-averaged data, the signs of the coefficients are largely the same but are often not significant. This may be caused by noise in the data.

In Florida, a nursing home's prospective rate is based on cost reports from six to eighteen months prior to the period for which the rate is being set.[12] Cost reports must be submitted by a skilled nursing facility within three months from the close of the annual reporting period.[13] A field audit or desk audit may be conducted at random or if there is reason to believe that the provider is claiming or has claimed reimbursement for unallowable costs. The rates are subject to ceilings and are set for six-month periods in January and July of each year. For more information regarding the rate-setting process, please see Appendix B.

As discussed above, a single rate per patient per day is paid to each facility. The total cost-related per diem for each facility is based upon the following categories: property costs, return on equity, operating costs, patient care costs, and incentive payments. For the first half of 1997, the statewide average Medicaid reimbursement rate was $93.16. The highest rate paid to any facility during this period was $141.76, and the lowest rate paid to any facility was $66.83. In contrast, in 1996, the average reported daily rate paid by private-pay residents was $138.93 for a private room and $126.87 for a semi-private room, and the mean revenue per patient day from Medicare funded residents was \$371.82. As discussed above, Medicare patient care is reimbursed on a cost basis per patient. Thus, a "Medicare reimbursement rate" is not available. Medicare revenue per patient per day, while not equivalent to such a rate, may arguably serve as a reasonable proxy.

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[12] Prior to July 1, 1991, the agency used cost reports from up to twenty-four months prior to the period for which the rates are being set. It is not clear that the potentially shorter period between cost report submission and use benefits nursing homes given that the cost report values are adjusted for inflation.

The rate differentials are likely to make Medicaid residents less desirable than other patients in markets with excess demand. As evidence of this, Ettner (1993) cites a variety of phenomena reputedly observed in the industry; a separate or fictitious waiting list for Medicaid patients: denial of access to heavy-care patients; inclusion of illegal clauses in admission contracts requiring private-payment for some length of time; provision of poorer quality of care or accommodations to Medicaid patients; requirement of 'voluntary' contributions to building funds before admission; refusal to have all eligible beds certified for Medicaid; and complete withdrawal from the Medicaid program. In addition, recent legislation has focused on the problem of dumping of Medicaid patients by two large nursing home chains in Florida. Clearly, Medicaid residents are perceived as less lucrative and part of this reputation is tied to relatively low Medicaid reimbursement rates.

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[13] If reports are more than six months late, the Medicaid provider agreement is cancelled.

Cost shifting and Testable Hypotheses

Building upon an analysis by Little (1992), the degree of subsidization of Medicaid patients by other patients in nursing homes given Medicaid reimbursement rates is considered.[14] In her paper, Little analyzes cost shifting using state-level measures, and she is unable to reject the hypothesis of cost shifting activity. In this essay, facility and resident level data is used to explore the hypothesis at the micro-level.

Expanding on Little's work, there are four groups of possible explanations for a situation in which the average Medicaid reimbursement rate is less than the average daily revenue per private patient. Medicaid recipients could be:

1. subsidized by the private sector,
2. receiving lower quality care in the same nursing homes or congregated in lower quality homes,
3. receiving lower cost care in the same nursing home or congregated in less expensive nursing homes, or
4. on average less disabled than private-pay patients.

Explanation One: Medicaid Recipients Are Being Subsidized

Little argues that Medicaid recipients are likely to be subsidized by the private sector. If cross-subsidization is occurring, then the greater the proportion of Medicaid patients in a home, ceteris paribus, the greater the subsidy will have to bend to cover the costs of Medicaid patient care. Thus, the higher the percent Medicaid in a home, the larger the private price will have to be relative to the Medicaid reimbursement rate.

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[14] The term "nursing home" is used interchangeably with "skilled nursing facility."

The ability and willingness of nursing homes to subsidize may depend on the nursing home's ownership type and market power. Some authors, such as Scanlon (1980), have argued that non-profit and government run homes may be more inclined to provide patients with lower than profit-maximizing prices. However, it may be shown that utility maximizing non-profit nursing homes, which wish to provide charity care, will act like profit maximizing nursing homes by charging the profit maximizing price and using the returns to fund charity care (Morrisey 1994). Riportella-Muller and Slesinger (1982) find that for-profit and non-profit nursing homes in Wisconsin have a similar number of regulatory violations. Along similar lines, Simpson and Shin (1996) use a county level Herfindahl as a measure of market power and find that non-profit hospitals set higher prices when they have more market power. Thus, the gap may be affected by the nursing home's ownership type. It is unclear whether chain ownership of a nursing home should affect subsidization independent of ownership type, but chains may have an incentive to reinforce a reputation for subsidizing Medicaid residents if there are public relations benefits to be gained from having a reputation for subsidizing "charity" cases.

Turning to the issue of market power, the ability to raise the price of nursing home care to self-pay residents is crucial for the existence of cross-subsidization among payer types. In the empirical specification, the following variables, which may influence the firms ability to subsidize, are related to a firm's market power: market concentration, the number of substitutes available for nursing home care, and the restrictiveness of CON policies in the market. Nursing homes in more concentrated markets may be able to charge self-pay residents a higher daily rate. In turn, substitutes for skilled nursing facility care, such as home health agencies and a relatively large proportion of women not in the labor force may decrease the ability of nursing homes to raise the price of care to private-pay patients without losing those patients.

Finally, a more restrictive CON policy implies few beds per individual age 65 and over in a market and less competition in the market. It is important to note, however, that this measure of CON policy is limited by the fact that there may not be uniform excess demand across markets. In other words, some rural, low-income areas may have few beds per elderly capita even though the CON regulatory board has uniformly accepted all applications to add new nursing home beds in the market. Clearly, if nursing homes construction is not sufficiently lucrative in rural, low-income areas, the less restrictive CON policies will not drive construction. However, the correlation between the CON application approval rate for the county and a binary variable for being in an urban area is .0863, implying that there is a *positive* relationship between being in an MSA and the CON approval rate. In addition, the correlation between the CON approval rate and per capita income in the county is .06616, implying that there is a *positive* relationship between the CON approval rate and per capita income. Both of these correlations would tend to negate the hypothesis that, in rural, low income areas, the CON regulatory authority is likely to be largely ineffective in its efforts to restrict the beds per elderly capita.

Thus, differences in market power, where the county is the market, are controlled for using the following set of variables: a Herfindahl-Hirschman index of market concentration, the number of home health agencies per capita, the labor force participation rate of women, and the number of nursing home beds per elderly capita.[15] Nyman (1989) and Zinn (1994) have used the female labor force participation rate as a proxy for alternatives to nursing home care in the market area and have used the number of home health agencies in the county is used as a measure of available substitutes.

To consider empirically whether a larger proportion of Medicaid residents within the home translates into a larger difference between the Medicaid and private prices, the difference between the private-pay price and the Medicaid reimbursement rate for each home is calculated. Using the calculated price gap as the dependent variable, ordinary least squares estimates of the impact of the proportion of Medicaid residents in the nursing home on the gap are conducted when controlling for ownership type (government owned, non-profit and for-profit), chain affiliation, measures of substitutes for nursing home care available in the community, market concentration, and the restrictiveness of CON policies in the county.

The results of the rate gap estimates are presented in columns one through six of Table One. Using different measures of the rate gap, in every case, increasing the proportion of Medicaid residents in the nursing home decreases the rate gap. This result implies that skilled nursing facilities with more Medicaid residents relative to other residents are not raising prices to private-pay residents to compensate for a larger number of low paying Medicaid residents.[16] In contrast, the negative coefficient on the proportion of Medicaid residents in the home is consistent with rate-setting incentives that increase Medicaid reimbursement rates for homes with a high proportion of Medicaid residents, which implies a smaller rate gap. However, these estimates do not involve controls for quality or costs. Given that the nursing home simultaneously chooses quality and the self-pay price, when the proportion of Medicaid residents in a nursing home is high, one might expect the home to be a low quality, low cost home. In such a scenario, one would expect the private-pay rate to be lower, ceteris paribus, driven by the low level of costs and quality. Following an examination of nursing home costs, the relationship between revenue from Medicaid residents and revenue from self-pay patients in a given nursing home will be reconsidered.

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[15] Other authors conducting studies of skilled nursing facilities have used the county as the market area.

The issue of cross-subsidization may also be examined from the perspective of costs. In the industrial organization literature concerned with natural monopoly regulation, the issue of subsidization of one group of consumers by another group of consumers has been considered by economists. Economists have formulated two tests for cross-subsidization: the average incremental cost test and the stand-alone test.[17]

Beginning with the average incremental cost test, if the cost of jointly producing a quantity of good one, of good two, and of good three is $C(X_1, X_2, X_3)$, then the

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See Ettner (1993), Nyman (1989), and Zinn (1994).

[16] The impact of the proportion of Medicaid residents in a home on the rate differential between Medicare and Medicaid was also examined. However, the coefficient on the proportion of Medicaid residents was not significantly different from zero. This is expected given that all nursing homes have an incentive to maximize Medicare reimbursement, and nursing homes are not at risk of losing Medicare patients when they submit higher costs to the Medicare program for reimbursement.

[17] For more information about the average incremental cost test and the stand-alone test, see Braeutigam (1989) and Viscusi, Vernon, and Harrington (1992).

Table One: Rate Gap Estimates

Variable	Rate Gap 1	Rate Gap 2	Rate Gap 3	Rate Gap 4	Rate Gap 5	Rate Gap 6	Lerner Index Cross-Subsidizers
Constant	19.28686	36.39987	31.33482 *	49.03201 *	11.84059 *	17.58623 *	-0.13801
	(1.59)	(1.58)	(3.91)	(5.99)	(1.98)	(2.17)	(0.51)
Percent Medicaid	-17.47399 *	-21.79477 *	-16.07620 *	-29.67526 *	-3.69411	-1.72845	
	(2.78)	(1.84)	(3.99)	(7.17)	(1.07)	(0.37)	
Avg. Medicaid Revenue							-0.000942 *
							(2.04)
Herfindahl	-3.38455	-14.18526	-12.25641 *	-9.77683 *	-3.60204	-6.56617	0.44302
	(0.44)	(1.07)	(2.50)	(2.13)	(0.81)	(1.22)	(0.82)
Profit	6.94752	3.61850	-1.60314	-6.85481	7.46094	-3.12758	
	(0.88)	(0.30)	(0.30)	(1.54)	(1.51)	(0.59)	
Non-profit	10.29105	10.90058	-3.63782	-5.40955	-1.28185	4.24591 *	-0.00148
	(1.28)	(0.90)	(0.66)	(1.22)	(0.58)	(1.70)	(0.01)
Chain owned	-3.67927	-13.18775 *	0.04272	-0.93712	-0.99383	-2.44848	0.03882
	(1.13)	(2.34)	(0.02)	(0.48)	(0.53)	(1.07)	(0.48)
Home Health Agencies	2333.2805	2107.7454	-1605.4408	-1184.9661	-1060.7356	-158.2277	-1190.4062 *
	(0.52)	(0.35)	(0.56)	(0.58)	(0.40)	(0.07)	(2.32)
LFPR of Women	0.09077	-0.02075	0.04167	-0.07324	0.01035	-0.09876	0.00316
	(0.50)	(0.06)	(0.35)	(0.61)	(0.10)	(0.70)	(0.61)
Beds per elderly	9.28493	72.02105	-23.00777	-16.20967	-17.31128	-61.37170 *	5.64180
	(0.30)	(0.85)	(1.16)	(0.55)	(0.96)	(1.78)	(1.71)
Number of observations	566	224	562	219	569	224	42
R-squared	0.02	0.07	0.07	0.29	0.02	0.06	0.23

Notes: The values in parantheses are t-statistics. * indicates significance at, at least, the 10% level.

Rate Gap 1=(Revenue per private-pay resident-Revenue per Medicaid resident). Rate Gap 2=(Revenue per private-pay resident-Reported Medicaid reimbursement rate). Rate Gap 3=(Reported private-pay daily rate-Revenue per Medicaid resident). Rate Gap 4=(Reported private-pay daily rate-Reported Medicaid reimbursement rate). Rate Gap 5=(Reported semi-private-pay daily rate-Revenue per Medicaid resident). Rate Gap 6=(Reported semi-private-pay daily rate-Reported Medicaid reimbursement rate).

incremental cost of producing X_1 is the added cost of producing X_1 given that X_2 of product two and X_3 of product three are already being produced. Expressed using the above notation, the incremental cost of producing X_1, $IC(X_1)$, is as follows:

$$IC(X_1) = C(X_1, X_2, X_3) - C(0, X_2, X_3) \tag{13}$$

and the average incremental cost of producing good one is

$$AIC(X_1) = IC(X_1) / X_1 \tag{14}$$

Cross-subsidization exists if the price of X_1 is less than the average incremental cost of producing X_1.

A second test for subsidy from the industrial organization literature is the stand-alone test. As shown above, the incremental cost test establishes a lower bound on the revenues that must be generated by production of the nth product to deem it subsidy free. In contrast, the stand-alone test sets an upper bound on the revenues generated by producing the nth good; if the revenues generated by production of the nth good exceed the costs of providing the nth good alone, then proceeds from production of the nth good are being used to subsidize the production of other goods. In the case of three outputs, the stand-alone test, where the nth good is self-pay resident days, can be represented as follows:

$$C(X_n, 0, 0) \geq X_n P_n \tag{15}$$

where $C(X_n, 0, 0)$ is the cost of producing only good n (self-pay resident days), X_n is number of self-pay resident days produced, and P_n is the daily rate paid by private-pay residents. In words, the costs of producing only self-pay patient days must be greater than or equal to the revenue from self-pay residents if self-pay residents are to avoid cross-subsidizing other resident types. If the revenue is greater than the cost, then investors would benefit from the existence of a new firm that only produces private-pay resident days.

To test for subsidization of Medicaid residents by residents funded through other means and for the ability of self-pay residents to subsidize such care, a joint-production cost function, $C(X_{MD}, X_P, X_{MR})$, is estimated. If the first good is Medicaid patient days, the cost function may be evaluated at zero production of Medicaid patients to find $C(0, X_P, X_{MR})$ or at zero production of Medicaid and Medicare patients to find $C(0, X_P, 0)$. For the estimates, a multi-product generalized translog cost function is chosen to avoid placing undue restrictions on the form of the production function.[18] The translog is based on the neoclassical cost function, where costs are a function of outputs and input prices.[19] The use of the translog function, in contrast to functional forms such as Cobb-Douglas, reduces the restrictions placed on the structure of production. The "generalized" translog is used because it allows for zero levels of output.[20]

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[18] Authors that have used the translog form for nursing home and hospital cost function estimation include Conrad and Strauss (1983), Gertler and Waldman (1992), McKay (1989), and Vita (1990). Vitaliano and Toren (1994), Kooreman (1994), and others have used the stochastic frontier cost function or data envelopment analysis (DEA) instead of the translog to estimate nursing home costs. The primary appeal of the stochastic frontier and DEA estimation are the ability of these methods to identify inefficiency for a given nursing home, an issue that is not considered in this dissertation. However, strong and non-testable assumptions are required for these methods. In the DEA framework, there is assumed to be no random error and no random fluctuations in output. While stochastic frontier estimation does allow for measurement error, the error distribution is assumed to be the sum of a half-normal and a normal. For a more in-depth discussion of these issues, please see the Symposium on Frontier Estimation in the Journal of Health Economics, Vol. 13, No. 3 (1994).

[19] See Caves et al. (1980) for a discussion of the properties of the translog cost function.

[20] For the ordinary translog function, zero levels of outputs are a problem given that the natural logarithm of zero is undefined. The generalized translog solves this problem by applying a Box-Cox transformation to the output variables. The Box-Cox transformation of output Y is $(Y^{\lambda}-1)/\lambda$, where λ is the Box-Cox parameter. As λ approaches zero, the Box-Cox transformation closely approximates the natural logarithmic transformation. See Caves et al. (1980).

The total costs of an individual nursing home are a function of outputs (measured by resident days), of relative input prices, and of a vector of control variables. The model contains three outputs: Medicaid patient days, Medicare patients days, and private-pay patient days, where private-pay patient days include days funded by "other" means. The use of three outputs, as opposed to one or two outputs, is supported by F-tests, which provides empirical support for separating nursing home residents into three groups.[21]

The model also contains four inputs: labor (including nursing services), property, patient care services (less nursing services), and other inputs. The relative prices of the first three inputs are measured as by the following price indices: a hospital wage index for the MSA, a housing price index by county, and a general price index by county.[22] Because of unavailability of data on the price of "other inputs," the conventional assumption that these prices are uniform across the nursing homes in the sample is employed. Through this assumption, the price of other inputs serves as a numeraire in imposing the input homogeneity restrictions.

In addition, the right hand side variables, with the exception of the binary variables, are mean-scaled to help reduce problems of multicollinearity. Mean-scaling reduces the size of the original variable and of the log of the original variable. As a result of the reduction, the slope of the log function is steeper at lower values.[23]

Thus, the cost function is as follows:

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[21] In the case where all nursing home residents days were grouped into one output measure, the F-test statistic is 61.049. When private-pay and Medicaid resident days are grouped together, the test statistic is 137.834.

[22] See Appendix A for data sources.

[23] See Fournier and Mitchell (1992) and Vita (1990) for other examples of the utilization of this technique.

$$\ln C = \alpha_0 + \Sigma_i\, \alpha_i\, [(Y_i^{\lambda}\text{-}1)/\lambda] + 1/2\, \Sigma_i\, \Sigma_j\, \delta_{ij}[(Y_i^{\lambda}\text{-}1)/\lambda]\, [(Y_j^{\lambda}\text{-}1)/\lambda] + \Sigma_k\, \beta_k \ln W_k +$$

$$1/2\, \Sigma_k \Sigma_l\, \gamma_{kl} \ln W_k \ln W_l + \Sigma_k \Sigma_l\, \rho_{ik}\, [(Y_i^{\lambda}\text{-}1)/\lambda] \ln W_k + \phi \ln K + \varepsilon \qquad (16)$$

where Y_i is the output indexed by i=1, 2, 3,

W_k is the input price index indexed by k=1, 2, 3,

K is the number of beds in the nursing home, a measure of fixed inputs,

and $\delta_{ij} = \delta_{ji}$ and $\gamma_{kl} = \gamma_{lk}$.

Linear homogeneity in input prices are ensured by the following restrictions:

$\Sigma\beta_k = 1$, $\Sigma\gamma_{kl} = 0$, and $\Sigma\rho_{ik} = 0$.

The corresponding factor cost share equations associated with each input are estimated simultaneously with the cost function. Since the factor shares must sum to one, one share equation must be excluded from the estimation process to prevent singularity. The cost share for each of the remaining variable inputs may be expressed as follows:

$$S_k = \beta_k + \Sigma_l\, \gamma_{kl} \ln W_k + \Sigma_i\, \rho_{ik}\, [(Y_i^{\lambda}\text{-}1)/\lambda] + \varepsilon \qquad (17)$$

for k =1, 2, 3. This system of equations is estimated through the method of nonlinear seemingly unrelated regression.

Along with the input prices and output variables, control variables are added to the cost function specification. For a description of the variables involved, see Table Two.

Eight cost function specifications are utilized to allow for estimates using two measures of the disability level of the nursing home population (i.e. case-mix) and combinations of three measures of quality. An examination of Table Three, which contains the cost estimate results, reveals that the cost function estimates provide predicted total cost estimates, at the mean values of the explanatory variables, of approximately $2.5 million; these compare favorably to the sample mean of the total cost variable, which is $2.7 million.

All of the coefficients on the output variables are positive, the coefficients on the input price indices are positive, and the control variables have economically intuitive signs. For example, an increase in the case-mix (debility) level of the residents of the nursing home led to a increase in costs.[24] Moreover, non-profit and government owned nursing homes have higher costs than for-profit homes, where the costs are higher for government owned than non-profit facilities. However, the costs of for-profit and non-profit homes may be fundamentally different. To examine the issue more closely, the overall impact of differences in cost levels between the two types of firms may be considered. When evaluated at the sample means, non-profit firms are predicted to have costs that are 29.9 percent higher than for-profit firms. However, 21.4 percent of 29.9 percent differential may be explained by differences in the measured characteristics of non-profit and for-profit facilities. In other words, most of the cost difference between for-profit and non-profit entities may be explained by differences in size, patient populations, and levels of service.

In terms of quality, columns 1, 3, 5, 6, 7, and 8 of Table Three reveal that an increase in the number of inspection related deficiencies per patient is associated with lower costs, while columns 2, 4, 5, 6, 7, and 8 show that an increase in the number of

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[24] The construction of the case-mix variables will be discussed at length later in the paper.

Table Two: Cost Function Variables

Costs: ln C-	The logarithm of total nursing home costs per year.
Outputs:	
Private (X1)-	The annual number of private-pay and other resident patient days.
Medicaid (X2)-	The annual number of Medicaid resident patient days.
Medicare (X3)-	The annual number of Medicare resident patient days.
Input Prices:	
W1-	The annual price index for hospital wages by MSA, a proxy for relative nursing home wages.
W2-	The annual price index by county for housing.
W3-	The annual composite price index by county.
Fixed Input:	
Capital-	The number of beds in the nursing home.
Control Variables:	
Percent 65+-	The proportion of the population in the county over age 65.
Case-mix-	The Katz index of activities of daily living or the Thoms index, a case-mix indices of health status.
Herfindahl-	The Herfindahl index, a measure of market concentration, based on resident days for all nursing homes within the county.
Non-profit-	Binary variable equal to one if the hospital is non-profit.
Government-	Binary variable equal to one if the hospital is government owned.
Chain-	Binary variable indicated whether the nursing home is part of a chain of nursing homes.
Hospital Based-	Binary variable indicating whether the nursing home is hospital based.
Beds per elderly-	The number of beds per person age 65+ in the county, a measure of the restrictiveness of the market for nursing home beds, resulting from the Certificate-of-Need process.
Quality-	The number of deficiencies per patient day, the number of registered nurse hours per patient day, and/or the number of total nurse hours per patient day.
Urban-	Binary variable indicating whether the nursing home is in an MSA.

registered nurse (RN) hours per patient or an increase in the number or total nurse hours per patient is associated with higher costs.[25] In other words, higher quality implies higher costs. The correlation between the number of inspection deficiencies and the number of RN hours is .51. When exogenous variables are correlated, the coefficient estimates should have a high variance. Thus, specifications are estimated, as shown in Table Three, that include both quality measures and that include just one of the quality measures.[26] When both quality variables are included in the cost function estimates, increasing the number of RNs per capita increases costs while increasing the number of deficiencies per resident decreases costs, i.e. the high-quality-high-cost relationship holds.

While the number of RNs has been used by other authors as an indicator of quality, one might argue that the total number of nursing hours per patient day may be a better indicator of quality of care than only registered nurse hours. Thus, the cost function is estimated, replacing the number of RN hours per capita with the per capita amount of the sum of RN hours, licensed practical nurse hours, and nurse aide hours. As expected, given that nurse hours are a process (or input) measure of quality, the coefficients on the total nurse hours measure are larger than the coefficients on the RN hours, but both variables are significant.

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[25] The quality measures will be considered at length later in this essay.

[26] If the true coefficient of one of the collinear variables in the equation being estimated is zero, then simply omitting one of the collinear variables is appropriate. If the true coefficient of the omitted variable is not zero, then a specification error is created, and the parameters of the variables that are correlated with the omitted variable become biased.

Table Three: Cost Function Estimates

Variable	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Constant	14.77308 *	14.73722 *	14.73812 *	14.70314 *	14.71028 *	14.743189 *	14.650513 *	14.628679 *
	(191.50)	(188.84)	(180.04)	(178.72)	(180.36)	(191.50)	(186.30)	(177.27)
Private Pay (X1)	0.13790 *	0.13807 *	0.13447 *	0.13399 *	0.13357 *	0.1369 *	0.139821 *	0.138094 *
	(8.85)	(8.84)	(8.34)	(8.34)	(8.35)	(8.85)	(9.16)	(8.74)
Medicaid (X2)	0.24494 *	0.25937 *	0.23147 *	0.24430 *	0.23794 *	0.25107 *	0.263539 *	0.254742 *
	(9.58)	(10.03)	(8.12)	(8.54)	(8.40)	(9.88)	(10.46)	(9.06)
Medicare (X3)	0.31889 *	0.32205 *	0.31656 *	0.31980 *	0.31264 *	0.314908 *	0.311012 *	0.309978 *
	(20.90)	(20.85)	(20.41)	(20.48)	(20.25)	(20.73)	(20.74)	(20.35)
X1X1	0.04649 *	0.04849 *	0.04414 *	0.04508 *	0.04351 *	0.045815 *	0.046441 *	0.044768 *
	(6.04)	(6.21)	(5.60)	(5.64)	(5.66)	(6.11)	(6.41)	(6.02)
X2X2	0.04343 *	0.04574 *	0.04027 *	0.04237 *	0.03928 *	0.042319 *	0.04471 *	0.042622 *
	(6.18)	(6.31)	(5.36)	(5.47)	(5.32)	(6.13)	(6.74)	(5.98)
X3X3	0.05600 *	0.06537 *	0.05535 *	0.06275 *	0.05649 *	0.05715 *	0.054348 *	0.053919 *
	(8.34)	(10.08)	(8.23)	(10.23)	(8.61)	(8.73)	(8.65)	(8.55)
X1X2	-0.03108 *	-0.04604 *	-0.02927 *	-0.04314 *	-0.03508 *	-0.036895 *	-0.035586 *	-0.034014 *
	(4.17)	(5.99)	(3.92)	(5.63)	(4.59)	(4.84)	(4.94)	(4.71)
X1X2	-0.07324 *	-0.09547 *	-0.07246 *	-0.09199 *	-0.07706 *	-0.07782 *	-0.07529 *	-0.074591 *
	(6.74)	(9.03)	(6.68)	(9.14)	(7.15)	(7.21)	(7.20)	(7.14)
X2X3	-0.10042 *	-0.09542 *	-0.10034 *	-0.09740 *	-0.10001 *	-0.100079 *	-0.097601 *	-0.097482 *
	(9.11)	(9.29)	(9.11)	(9.65)	(9.23)	(9.23)	(9.22)	(9.20)
Wage Index	0.45752 *	0.45746 *	0.45749 *	0.45734 *	0.45749 *	0.457525 *	0.457523 *	0.457485 *
	(186.90)	(186.72)	(187.18)	(187.22)	(187.21)	(186.93)	(186.78)	(187.07)
Housing Price Index	0.13126 *	0.13100 *	0.13127 *	0.13098 *	0.13130 *	0.131293 *	0.131353 *	0.131359 *
	(55.57)	(55.77)	(55.67)	(55.89)	(55.74)	(55.64)	(55.69)	(55.79)
General Price Index	0.12300 *	0.12288 *	0.12303 *	0.12300 *	0.12304 *	0.123009 *	0.123028 *	0.123059 *
	(121.08)	(122.24)	(121.30)	(122.59)	(122.43)	(122.22)	(122.61)	(122.79)

Table Three--continued

Variable	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
W1W1	0.03421	0.01980	0.03611	0.02270	0.03878	0.036779	0.033315	0.035041
	(0.79)	(0.46)	(0.83)	(0.53)	(0.90)	(0.85)	(0.77)	(0.81)
W1W2	0.00084	-0.00188	0.00054	-0.00169	-0.00120	-0.000939	0.0004014	0.0002462
	(0.05)	(0.11)	(0.03)	(0.10)	(0.07)	(0.06)	(0.02)	(0.01)
W1W3	-0.05257 *	-0.04663 *	-0.05234 *	-0.04779 *	-0.05225 *	-0.052383 *	-0.052351 *	-0.052222 *
	(2.16)	(1.94)	(2.15)	(1.99)	(2.16)	(2.16)	(2.18)	(2.18)
W2W2	-0.01123	-0.01100	-0.01124	-0.01059	-0.00952	-0.009474	-0.01048	-0.010626
	(0.75)	(0.73)	(0.75)	(0.70)	(0.64)	(0.63)	(0.70)	(0.71)
W2W3	-0.01319	-0.01323	-0.01316	-0.01332	-0.01347	-0.013509	-0.013309	-0.013261
	(1.60)	(1.60)	(1.59)	(1.61)	(1.64)	(1.64)	(1.63)	(1.63)
W3W3	0.06088 *	0.05314 *	0.06057 *	0.05288 *	0.05964 *	0.059909 *	0.061554 *	0.061295 *
	(1.91)	(1.68)	(1.90)	(1.67)	(1.88)	(1.89)	(1.96)	(1.95)
X1W1	-0.01269 *	-0.01174 *	-0.01272 *	-0.01125 *	-0.01267 *	-0.012639 *	-0.012526 *	-0.012563 *
	(4.67)	(4.36)	(4.69)	(4.23)	(4.69)	(4.67)	(4.65)	(4.67)
X1W2	0.00530 *	0.00575 *	0.00530 *	0.00524 *	0.00526 *	0.0052593 *	0.0051611 *	0.0051678 *
	(2.04)	(2.25)	(2.05)	(2.07)	(2.04)	(2.04)	(2.01)	(2.02)
X1W3	0.01077 *	0.01110 *	0.01076 *	0.01129 *	0.01071 *	0.010711 *	0.010548 *	0.010551 *
	(8.85)	(9.39)	(8.86)	(9.58)	(8.93)	(8.93)	(8.87)	(8.87)
X2W1	0.00067	0.00051	0.00069	0.00019	0.00070	0.0006811	0.0007036	0.0007221
	(0.30)	(0.23)	(0.31)	(0.08)	(0.32)	(0.31)	(0.32)	(0.33)
X2W2	0.01074 *	0.01085 *	0.01072 *	0.01117 *	0.01065 *	0.010668 *	0.0105 *	0.010491 *
	(4.89)	(4.99)	(4.89)	(5.16)	(4.91)	(4.91)	(4.89)	(4.89)
X2W3	0.00931 *	0.00938 *	0.00929 *	0.00931 *	0.00920 *	0.0092116 *	0.0090807 *	0.0090751 *
	(9.10)	(9.37)	(9.09)	(9.42)	(9.16)	(9.17)	(9.17)	(9.17)
X3W1	0.01994 *	0.02032 *	0.01993 *	0.01926 *	0.01983 *	0.019841 *	0.019691 *	0.01969 *
	(6.66)	(6.98)	(6.67)	(6.81)	(6.66)	(6.66)	(6.65)	(6.65)

Table Three--continued

Variable	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
X3W2	0.00086	0.00002	0.00085	0.00088	0.00091	0.0009122	0.0009932	0.0009875
	(0.30)	(0.01)	(0.30)	(0.33)	(0.32)	(0.32)	(0.35)	(0.35)
X3W3	-0.02015 *	-0.02055	-0.02013 *	-0.02074 *	-0.02004 *	-0.020051 *	-0.01987 *	-0.019863 *
	(15.22)	(16.05)	(15.22)	(16.44)	(15.35)	(15.36)	(15.34)	(15.33)
Percent elderly	-0.03831	-0.04837	-0.02950	-0.04261	-0.02417	-0.03137	-0.026231	-0.020221
	(0.80)	(1.01)	(0.60)	(0.87)	(0.50)	(0.66)	(0.56)	(0.42)
Case-mix (Katz)		0.08767 *	0.13747 *		0.13388 *			0.120633 *
		(1.68)	(2.43)		(2.39)			(2.19)
Case-mix (Minutes)	0.10727 *			0.11746 *		0.105657 *	0.100456 *	
	(2.07)			(2.08)		(2.06)	(1.99)	
Herfindahl	-0.01328	-0.00656	-0.00922	-0.00301	-0.00117	-0.005223	-0.009025	-0.005477
	(0.81)	(0.39)	(0.56)	(0.18)	(0.07)	(0.32)	(0.56)	(0.34)
% elderly*Herfindahl	0.00579	0.00022	0.00309	-0.00235	-0.00660	-0.003897	-0.001075	-0.003368
	(0.37)	(0.01)	(0.19)	(0.14)	(0.41)	(0.24)	(0.07)	(0.22)
Case-mix*Herfindahl	0.01989	0.03609	0.01130	0.03085	0.01702	0.024025	0.018719	0.012565
	(0.50)	(0.90)	(0.27)	(0.75)	(0.42)	(0.61)	(0.48)	(0.31)
Government owned	0.34476 *	0.32520 *	0.34717 *	0.32817 *	0.33191 *	0.329368 *	0.314515 *	0.317854 *
	(7.07)	(6.53)	(7.13)	(6.61)	(6.82)	(6.76)	(6.54)	(6.62)
Non-profit	0.08693 *	0.09358 *	0.08426 *	0.09000 *	0.08568 *	0.088382 *	0.081764 *	0.079488 *
	(3.78)	(4.02)	(3.66)	(3.89)	(3.75)	(3.87)	(3.63)	(3.53)
Chain owned	-0.03102	-0.02624	-0.02990	-0.02536	-0.02684	-0.027965	-0.021107	-0.020508
	(1.57)	(1.32)	(1.51)	(1.28)	(1.37)	(1.43)	(1.09)	(1.06)
Number of beds	0.02110	0.01424	0.01816	0.01139	0.02518	0.028165	0.03541 *	0.032745 *
	(1.13)	(0.78)	(0.97)	(0.62)	(1.34)	(1.50)	(1.90)	(1.75)
Hospital based	0.00038	-0.00004	-0.00224	-0.00932	-0.01020	-0.007565	-0.008421	-0.010376
	(0.01)	(0.0)	(0.06)	(0.24)	(0.26)	(0.20)	(0.22)	(0.27)

Table Three--continued

Variable	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Quality (Deficiencies)	-0.01620 * (2.23)		-0.01661 * (2.29)		-0.01906 * (2.63)	-0.018669 * (2.58)	-0.020166 * (2.83)	-0.020437 * (2.87)
Quality (RNs per patient day)		0.02308 * (2.75)		0.02265 * (2.72)	0.02744 * (3.31)	0.027513 * (3.32)		
Quality (All labor)							0.124168 * (5.40)	0.122401 * (5.31)
Beds per elderly	-0.00479 (0.58)	-0.00126 (0.15)	-0.00453 (0.55)	-0.00106 (0.13)	-0.00329 (0.40)	-0.003533 (0.43)	-0.003479 (0.43)	-0.003334 (0.41)
Urban	-0.01845 (0.54)	-0.01013 (0.29)	-0.01600 (0.55)	-0.00905 (0.26)	-0.01159 (0.34)	-0.014019 (0.41)	-0.010765 (0.32)	-0.008806 (0.26)
Predicted Total Cost	$2,532,216	$2,520,707	$2,531,806	$2,516,027	$2,530,835	$2,531,233	$2,530,200	$2,529,880
Number of observations	618	623	618	626	618	617	617	618
Mean AIC of Medicaid	$25.44	$13.06	$24.49	$12.83	$20.47	$21.43	$24.28	$23.92
% with cross-subsidization	37%	40%	34%	33%	34%	38%	47%	45%
% with cross-subsidization-stand alone	14%	6%	17%	21%	18%	18%	14%	15%

Note: * indicates significance at, at least, the 5% level.

Mean-scaling also allows for ease in interpretation of some of the coefficients. For example, the estimated intercept coefficients in the share equations are the estimated mean cost shares. Also, the coefficient for each output represents the elasticity of that output with respect to costs at the sample mean value of the variable. As expected, the production of private-pay patient days is more sensitive to changes in costs than the production of Medicaid and Medicare days. This is due to the fact that changes in factor costs can most easily be passed along to Medicare and Medicaid residents, who do not pay out of pocket for nursing home care.[27]

Given the estimates, the average incremental costs of Medicaid patients in a skilled nursing facility with mean characteristics is \$22.30-\$47.13. When examining the AIC for each facility, it is apparent that, in approximately one-third to one-half of nursing homes, the facility's Medicaid reimbursement rate is less than the average incremental cost of providing nursing home care to Medicaid patients.[28] Correspondingly, slightly over one-third of all firms fail the stand-alone test conducted for self-pay residents. In other words, over one-third of nursing homes obtain more revenue from self-pay residents than it costs them to produce private-pay resident days. Thus, there is evidence that cross-subsidization of Medicaid patients is taking place in some skilled nursing facilities, where private-pay residents appear to be in a position to subsidize such care.

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[27] Medicaid reimbursement rates are set using cost reports from earlier periods, thus regulators allow for cost-oriented adjustments in the rates with a lag.

[28] The cost function was also estimated using only nursing homes with no Medicaid residents. Using the coefficient estimates from the "no Medicaid" sample and mean values for the right hand side variables from the entire sample, 29%-30% of all nursing homes were found to be cross-subsidizers.

When examining the AIC for each facility, it is apparent that, in approximately one-third to one-half of nursing homes, the facility's Medicaid reimbursement rate is less than the average incremental cost of providing nursing home care to Medicaid patients. However, for some nursing homes that are identified as cross-subsidizers, the average incremental cost of care for self-pay residents is also greater than the self-pay price. In his paper, Vita (1990) discusses the properties of flexible form functions like the translog cost function. Flexibility is a local property, which implies that flexible forms may perform poorly for data points located far from the approximation point, which by convention, is usually the sample mean. As shown in equation (13), the incremental cost estimate for good one requires that the function be estimated at zero level of output for good one. Thus, the estimated average incremental cost may be incorrect. To control somewhat for this effect, apparent cross-subsidizing nursing homes for which the private-pay price is less than the average incremental cost of care for self-pay patients are identified and excluded from the "true" cross-subsidizer sample. These nursing homes comprise approximately one-third of the sample of the nursing homes found to be cross-subsidizers. Thus, when only "true" cross-subsidizers are considered, the proportion of nursing homes identified as cross-subsidizers drops to between 22 and 33 percent of all nursing homes.

Recall that the rate gap estimates presented above did not allow for controls for quality and costs. Given the cost function estimates and daily reimbursement rates, one can explore the relationship between net revenues from self-pay residents and net losses from Medicaid residents at the facility level. The gross revenue from private-pay residents is calculated by multiplying the private-pay daily rate by the quantity of private-pay resident days in the nursing home, and the estimated cost of care for private-pay residents in the nursing home is the estimated nursing home specific incremental cost of care for self-pay residents. The net revenue from Medicaid residents is found in a similar fashion using the Medicaid reimbursement rate, the number of Medicaid patient days, and the incremental cost of caring for Medicaid residents. Note that the use of the nursing home specific incremental cost estimates allows one to control for both costs and quality. The correlation between net revenue from self-pay residents and net revenue from Medicaid residents is –0.3963.[29] Thus, contrasting with the initial rate gap evidence, when one controls for costs and quality, net revenue from self-pay residents is negatively related to net revenue from Medicaid residents.

Given the average incremental cost estimates for the subset of nursing home that are identified as subsidizing Medicaid patient care but not subsidizing self-pay resident care, one can revisit the issue of the rate gap econometrically. As discussed above, the subsidization of Medicaid residents rests on the ability of firms to profitably set price above marginal cost for self-pay residents. The profit-maximizing condition for firms with market power is that the price-cost markup, given by the difference between price and marginal cost as a fraction of price, be equal to the inverse of the elasticity of demand faced by the firm. If the price markup, or Lerner Index of market power, is large and positive, then the firm is clearly setting price above marginal cost. In the case of the cross-subsidizing nursing home, the nursing home's price markup to self-pay residents may be increasing in lower levels of net revenue from Medicaid residents. In other words, lower Medicaid revenues should result in higher price markups for self-pay patients when controlling for costs and quality in nursing homes that cross-subsidize. Estimates of the Lerner Index for cross-subsidizing nursing homes are contained in the last column of Table One.[30] As the negative coefficient on average Medicaid revenue reveals, when net revenue per Medicaid patient is increased for cross-subsidizing homes, the price markup to self-pay patients decreases. In other words, when faced with lower Medicaid revenue, cross-subsidizing nursing homes increase the price charged to self-pay nursing home residents.

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[29] When one examines the relationship between net revenue from self-pay residents and net revenue from

Given that some nursing homes have been identified as cross-subsidizers, one might wish to develop a profile of such homes. An examination of the mean characteristics of homes that do cross-subsidize contained in Table Four reveals that cross-subsidizing nursing homes have higher annual total costs ($3,398,675) than homes that do not cross-subsidize ($2,307,624). Cross-subsidizing homes also have higher private-pay daily rates, are more likely to be located in urban areas, and are more likely to be for-profit and chain-owned. In addition, cross-subsidizing homes are more likely to be located in markets with fewer beds per elderly capita, i.e. cross-subsidizing homes are more likely to be in markets in which the bed supply is restricted by CON regulators. Thus, there is some evidence that

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Medicaid residents in a subset of nursing homes that cross-subsidize, the correlation is -0.4777.

[30] Average incremental cost is substituted for marginal cost in the construction of the Lerner Index for each nursing home. The prices used are identical to those used in column four of the rate gap estimates: the reported private-pay daily rate and the reported Medicaid reimbursement rate. However, the results with respect to the effect of Medicaid revenue on the price markup hold when proxies for price, such as revenue per Medicaid patient, are used in the estimates.

Table Four: Characteristics of Nursing Homes: Cross-Subsidizers vs. No Cross-Subsidy

Variable	Cross-Subsidizers Means	No Cross-Subsidy Means
Total Costs	$3,398,675	$2,307,624
Quality (Deficiencies)	0.05963	0.08141
Quality (RNs per patient day)	0.07309	0.06619
Case-mix (Thoms)	154.29017	141.53258
Case-mix (Katz)	4.64554	4.38620
For-profit	93.02%	77.08%
Non-profit	6.98%	18.75%
Herfindahl	0.05739	0.14703
Chain owned	80.41%	70.83%
Beds per elderly	0.02816	0.03987
Urban	97.67%	83.33%
Self-Pay Daily Rate	$88.06	$69.23
Hospital based	4.12%	0.00%

nursing home owners subsidize care to Medicaid residents in exchange for regulatory favors.

However, the finding of cross-subsidization using the static cost function estimates may not represent cross-subsidization across residents in nursing homes, as it fails to capture the fact that a nursing home resident may not be the same payer type throughout his or her entire nursing home stay. For example, a single nursing home resident may transition from Medicare, to self-pay, to Medicaid in a single nursing home stay. In such a scenario, the resident may pay higher rates initially and lower rates toward the end of the stay, providing the nursing home with a stream of payments from the duration of the stay that is positive even when the net revenue from the Medicaid funded portion of the stay is negative. In other words, there may be intertemporal price discrimination but not true cross-subsidization among payer types.

One may consider this issue by examining the present value of the revenue stream from patients who are in nursing homes that are identified as "true" cross-subsidizers of Medicaid care given the average incremental cost estimates.[31] Nursing home residents generally enter the nursing home as one of three payer types: Medicare, Medicaid, or private-pay. Except in very unusual circumstances, nursing homes that subsidize care for Medicaid residents know with certainty that patients entering the home on Medicaid will not be profitable over their stay. However, there is less certainty regarding the present value of the net revenue stream from individuals who are initially Medicare and self-pay residents. As shown in Table Five, nursing home residents not entering the nursing home on Medicaid may undergo the following transitions: enter on Medicare and exit on Medicare; enter on Medicare and convert to Medicaid before exit; enter on Medicare and convert to self-pay before exit; enter on Medicare, convert to self-pay, and convert to Medicaid before exit; enter as self-pay and exit as self-pay; and enter as self-pay and convert to Medicaid before exit.

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[31] "True" cross-subsidizing homes are identified using the average incremental cost test as subsidizing care to Medicaid patients, where the self-pay reimbursement rate is greater than the average incremental cost of care for self-pay residents.

As shown in Table Five, 42.58 percent of residents that enter a cross-subsidizing nursing home on Medicare exit the nursing home within twenty days of admission. This is not suprising given that Medicare will only pay fully for the first twenty days of rehabilitative care following a three-day hospitalization. Therefore, individuals who might choose to take advantage of skilled nursing services during the period in which they are fully covered may not choose to remain in the nursing home when a fairly substantial copayment is required. In addition, only about six percent of individuals who enter a cross-subsidizing nursing home on Medicare convert to Medicaid. A similar percentage of self-pay residents eventually convert to Medicaid during their stay.

The present value estimates of net revenue may be calculated for each transition group. While most nursing home stays are of modest duration, some individuals do have lengthy stays. Thus, a conservative annual interest rate of two percent is used in the present value estimates; however, the estimates do not change significantly when discounting is not considered and when a larger interest rate is used. In addition, data on the length of time that it takes for patients that begin on Medicare to transition to self-pay

Table Five: Present Value of Net Revenue and Transition Probabilities

Enter Nursing Home on Medicare (20 Day Transition)

Transition Type	Mean P(Transition Type | Enter Medicare)	Mean Present Value of Net Revenue Stream
Medicare Only	42.58%	$121.72
Medicare to Medicaid	1.22%	-$134.88
Medicare to Self-Pay	51.42%	$1,399.99
Medicare to Self-Pay to Medicaid	4.78%	-$438.04
Predicted PV of Enter as Medicare		$772.07

Enter Nursing Home as Self-Pay

Transition Type	Mean P(Transition Type | Enter Self-Pay)	Mean Present Value of Net Revenue Stream
Self-Pay Only	94.49%	$3,277.12
Self-Pay to Medicaid	5.51%	-$395.47
Predicted PV of Enter as Self-Pay		$3,073.25

is not available. Thus, the following estimates of the duration of this transition period are used in the calculations: twenty days, fifty days, and one hundred days. However, the results reveal that the use of different cutoffs only affect the magnitude, but not the sign, of the present value estimates. Thus, the conservative twenty day cutoff is used.

In each case for each transition type, the present value of a resident's payment stream over the nursing home stay may be calculated given the average time spent in each payer category, the nursing home specific reimbursement rate for each payer type, the nursing home specific average incremental cost estimate for each payer type, and the interest rate. Unfortunately, the estimated average incremental cost for Medicare residents is uniformly, unrealistically large.[32] This fact, coupled with the lack of a true "Medicare reimbursement rate," necessitates the substitution of the self-pay reimbursement rate and estimated self-pay average incremental cost in the net revenue per day calculation for the Medicare portion of the nursing home stay.

In all three cases where the individual transitions from Medicare or self-pay to Medicaid during the nursing home stay, the average present value of the stream of payments is negative. Thus, in general, Medicaid funded residents are not "subsidizing" their own costs of care through higher payment levels in the early days of the nursing home stay, supporting the finding of cross-subsidization *among* residents. However, the nursing home does appear to be adjusting the self-pay rate to account for the probability of transition, making the present value of the net revenue stream for individuals who enter on Medicare or enter as self-pay positive. Indeed, less then five percent of all cross-subsidizing nursing homes have predicted net negative returns for patients who enter the nursing home on Medicare or as self-pay. Thus, nursing homes do serve some residents who convert to Medicaid and are net losers. However, even though the nursing home is unable to identify these individuals at the outset, they are able to compensate for net losses from these payers through net revenues from those that do not convert to Medicaid. In sum, there appears to be little evidence of resident level intertemporal price discrimination; some types of residents are clearly net losers for the nursing home. However, residents that enter the nursing home as self-pay or on Medicare are probabilistically net winners for the nursing home.

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[32] As mentioned above, evaluating the flexible translog cost function at zero levels of outputs may be problematic. The very high estimates for Medicare average incremental costs may also be driven by nursing homes that accept large numbers of Medicare patients but are not likely to be cross-subsidizers.

Explanation Two: Medicaid Recipients are Receiving Lower Quality Care in the Same Home or Medicaid Recipients are Congregated in Low Quality Homes

While the cost function estimates presented above do attempt to control for the impact of quality on costs, the issue of quality in nursing homes may be considered explicitly. Generally, when modeling nursing home behavior, authors, including Little, Copeland (1997), Gertler (1992), and Gertler and Waldman (1992), assume that legislation works to prevent scenarios in which Medicaid patients receive lower quality care than other patient types in the same nursing home. These authors argue that, besides legal restrictions, most nursing home services, such as dietary services and medical care, are produced jointly for all payer types to take advantage of economies of joint production. However, laws may not be enforced and Medicaid patients may receive lower levels of care. Given data on skilled nursing facility residents, reasons for discharge, age, length of nursing home stay, and primary diagnosis on admission to the nursing home, one can test for disparate treatment in the same facility.

Using the resident level data, the probability of death for residents that never convert to Medicaid is 0.18, the probability of death for residents that enter the nursing home as Medicaid patients is 0.34, and the probability of death for residents that convert to Medicaid during their stay is 0.39. Thus, the unadjusted probability gap between always-Medicaid and never-Medicaid patients is 0.16, and the gap between converters and never-Medicaid is 0.21. To determine how much of the gap may be accounted for by holding constant other variables affecting the probability of death in a nursing home, a probability of death probit is estimated. In the regression specification, the probability of death for a nursing home resident is a function of a binary variable for primary diagnosis upon admission,[33] the source of the resident immediately prior to admission to the nursing home,[34] the age of the resident upon admission, a binary variable indicating whether the resident's stay was always funded by Medicaid, a binary variable indicating whether the resident converted to Medicaid while in the nursing home, and a binary variable for each nursing home in the sample.[35]

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[33] The diagnosis categories are as follows: Primary Diagnosis 1=Cerebrovascual Accident, Primary Diagnosis 2=Arterioscerotic Heart Disease, Primary Diagnosis 3=Organic Brain Syndrome (senility), Alzheimer's, Parkinson's, Primary Diagnosis 4=Cancer, Primary Diagnosis 5=Congestive Heart Failure, Primary Diagnosis 6=Diseases/Disorders of Respiratory System, Primary Diagnosis 7=Diseases/Disorders of Musculoskeletal System, Primary Diagnosis 8=Mental Disorders, Primary Diagnosis 9=Other. The category Primary Diagnosis 9 is the reference variable.

[34] The dummy variables for source prior to admission are as follows: Admitted from Home, Admitted from Hospital, Admitted from Adult Care Living Facility, Admitted from another Nursing Home, and Admitted from Other, where Admitted from Other is the reference variable.

[35] Other authors have used the probability of death as a numerical measure of nursing home outcomes. See Braun (1991) and Linn, Gurel, and Linn (1977).

The probit results are contained in Table Six. The coefficients on the always Medicaid and convert to Medicaid binary variables indicate that being funded by Medicaid increases a resident's probability of death when controlling for age, diagnosis, location prior to admission into the nursing home, and facility specific effects. For nursing home residents who enter the nursing home on Medicaid, the probability of death is approximately 7.5 percent higher than for those that are never funded by Medicaid. Furthermore, those that convert to Medicaid during the nursing home stay have an eleven percent higher probability of death than the reference group. However, it is important to note that the diagnosis binary variables are very rough, suggesting that some differences in severity of illness that are not captured in this data set are likely to exist. In addition, there may be a causal relationship between income and health, where Medicaid residents are inherently less healthy than other residents. Thus, the probit estimates of the probability of death suggest that Medicaid funded patients may be receiving differential treatment within the nursing home, but further investigation of this finding given more information on patient income and severity of illness is warranted.

Clearly, some primary diagnoses are more strongly associated with death in the nursing home than other diagnoses. For example, an individual with a primary diagnosis of cancer has a 24 percent higher probability of death than an individual with the diagnosis "other," and those with mental disorders as the primary diagnosis have nearly a five percent lower probability of death than those in the "other" diagnosis category. The

Table Six: Probit Estimates of Probablility of Death

	Marginal Effects	Means
Intercept	-0.64367 * (51.71)	1.00000
Always Medicaid	0.07434 * (55.08)	0.14980
Convert to Medicaid	0.11056 * (68.62)	0.07597
Primary Diagnosis 1	0.00866 * (5.92)	0.11933
Primary Diagnosis 2	-0.00047 (0.18)	0.02858
Primary Diagnosis 3	0.02514 * (15.21)	0.08296
Primary Diagnosis 4	0.24135 * (142.07)	0.06421
Primary Diagnosis 5	0.02200 * (12.84)	0.07304
Primary Diagnosis 6	0.04872 * (29.55)	0.08026
Primary Diagnosis 7	-0.12070 * (90.50)	0.24691
Primary Diagnosis 8	-0.04976 * (12.85)	0.01276
Admitted from Adult Living Facility	0.02088 * (4.42)	0.02261
Admitted from Skilled Nursing Facility	0.00284 (0.66)	0.05089
Admitted from Home	-0.02636 * (6.43)	0.11236
Admitted from Hospital	-0.03583 * (9.05)	0.80313
Age at Admission	0.00519 * (119.70)	78.97499
Length of Stay	0.00015 * (136.04)	186.03450
Number of Observations	971941	

Notes: The probit estimates also include a binary variable for each nursing home not shown above. The values in parantheses are t-statistics. * indicates significance at, at least, the 5% level.

relatively rough measure of patient illness represented by the primary diagnosis variables is unlikely to capture the full effect of the severity of a given individual's illness. As individuals who are in relatively poor health are likely to spend more on medical care, those who covert to Medicaid may be closer to death than those that do not convert. However, as will be shown later in the dissertation, the proportion of Medicaid residents in a nursing home does not appear to have a significant effect on the disability level of the nursing home's population. Thus, "converters" may be more ill than those that enter the home on Medicaid or never convert to Medicaid.

As anticipated, older patients are more likely to die, with each additional year of life contributing one-half of one percent to the probability of death. Likewise, patients with longer nursing home stays are more likely to die, where an additional 100 days in the nursing home increases the probability of death by 1.5 percent.

In addition to the possibility that Medicaid recipients are receiving lower quality care than other patients in the same facility, one can explore the relationship between the percentage of Medicaid recipients in a home and measures of quality. Many models of nursing home service provision assume that Medicaid patients do not (or, rather, cannot) value quality given that the government pays the skilled nursing facility a fixed rate per day for their stay. While in models like Copeland's and like the one presented in this dissertation, Medicaid patients are allowed to value quality, they still do not have the means to pay for quality. Thus, private-pay and Medicare patients may cluster in higher quality homes than Medicaid patients given the ability of private-pay and Medicare patients to pay for higher quality. To test for this phenomenon, two measures of quality are used: the number of cited inspection violations, i.e. deficiencies, per patient per day, the number of registered nursing hours per patient per day, and the total number of nursing hours per patient per day.

Before discussing the variables that are expected to affect quality in the nursing home, a more detailed discussion concerning the issue of quality is in order. As discussed in Chapter One, quality of health related services is both difficult to define and difficult to measure. In the industrial organization literature, Leffler (1982) provides a general discussion of product quality and firm behavior. He defines quality as the amount of the unpriced attributes contained in each unit of the priced attribute, where higher quality involves a higher level of the unpriced attribute per unit. In the case of a nursing home, the priced attribute is resident days. In this analysis, the unpriced attributes are skilled nursing (registered nurse) contact hours, general nursing contact hours, or degree of compliance with state inspection-related guidelines. Thus, with respect to the first two measures, a "higher quality" nursing home is one that has more registered nurse hours per patient day or more total nurse hours per patient day. Turning to the last measure, a "higher quality" nursing home has fewer inspection violations per patient day.[36]

The quality measures involving nurse hours capture two types of attributes associated with nursing care. First, all nurses have a degree of medical expertise, where more nurse hours per patient translates into more medical care per patient. Registered nurses clearly have more formal training than licensed vocational nurses and nurse aides. Thus, registered nurses should provide more of this attribute, medical expertise, per resident day than other nurses. Second, nurses provide human contact to residents, where more nurse hours per patient translates into more individualized attention for each resident.

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[36] Nyman (1985, 1989) used violations of licensing laws as a proxy for quality. Braun (1991), Davis (1991), Kooreman (1994), Monroe (1990), and Zinn (1994) use registered nursing hours as measures of quality.

Right hand side variables, which may affect the level of quality provided by the nursing home, are as follows: the level of disability of residents in the home (i.e., population case-mix), the proportion of Medicaid funded residents in the home, the proportion of Medicare funded residents in the home, ownership type (profit, non-profit, or government owned), market concentration, substitutes for nursing home care available in the community, chain affiliation, whether the skilled nursing facility is based in a hospital, the per capita income level in the county, the presence of an organized residents' group in the facility, the presence of an organized group of family members of residents, whether the facility is located in an MSA, the size of the facility, and a measure of the restrictiveness of CON policies in the county.

Two measures of case-mix are used in the estimates. First, following Cohen and Spector (1996), who utilize a system designed by Bill Thoms, case-mix is expressed in minutes of staff time typically required for the care of residents based upon their disability levels and care required. Minutes are estimated using weights based on the Management Minutes system developed by Bill Thoms. Under this system, the average number of minutes of nursing care, as garnered from time motion studies, are computed for different impairment levels and procedures.[37] The second measure of case-mix, the Katz index of Activities of Daily Living (ADL), is the most commonly used measure of the health status of an individual or nursing home population in nursing homes.[38] Given the available data, a measure very similar to the Katz index is constructed.[39] The slightly altered formulation involves summing the total number of residents needing either partial or total assistance in each of seven categories (bathing, dressing, going to the toilet, transferring, two categories involving continence, and feeding) and dividing the sum by the total number of residents in the home. The larger the number, the greater the level of debility of the nursing home population. Including a case-mix measure in the quality estimates effectively controls for quality differences that result from having a more or less disabled population in a given nursing home.

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[37] Case-mix is calculated as the sum of the following products:
- 20(percent of residents needing full assistance in bathing)
- 18(percent of residents needing partial assistance in bathing)
- 30(percent of residents needing full assistance in dressing)
- 30(percent of residents needing partial assistance in dressing)
- 20(percent of residents catheterized)
- 48(percent of residents incontinent)
- 90(percent of residents needing assistance in feeding, where food is taken into the body in a manner other than through the digestive canal)
- 90(percent of residents needing tube feeding)
- 45(percent of residents needing assistance in eating)
- 32(percent of residents non-ambulatory)
- 20(percent of residents with pressure sores)
- 50(percent of residents receiving bowel/bladder retraining)
- 36(percent of residents receiving special skin care).

[38] See Katz, Ford, Moskowitz, Jackson, and Jaffe (1963).

[39] There are two minor differences between the modified construction of the Katz index and the construction in the original paper outlining the Katz Index. The original paper discusses the construction of an ADL index for each patient. In this study, an ADL index is constructed at the level of the nursing home given that only information on the proportion of the nursing home population needing total, partial, or no assistance in completing the relevant activities is available. In addition, in the original paper, Katz et. al. use only one category for continence, while the constructed index uses two.

The coefficient on percent Medicaid in the home serves as a measure of the relationship between quality and payer type. If it is negative, then skilled nursing facilities with more Medicaid patients are providing lower levels of quality. In the model of nursing home behavior, quality and the quantity of each payer type chosen by a nursing home are simultaneously determined. Just as quality may be affected by payer-mix in the nursing home, the quality level may determine the payer-mix. Nursing homes with more Medicaid patients may choose to provide lower quality, and lower quality may lead to a relatively lower private-pay population and a relatively higher Medicaid population in the nursing home.[40] Given these relationships, two-stage least squares is used to estimate the relationship between quality, percent Medicaid, percent Medicare, and case-mix.[41] The following system of equations is estimated:

Quality = ϕ_1 + ϕ_2Case-Mix + ϕ_3Government Owned + ϕ_4Non-profit + ϕ_5Herfindahl + ϕ_6Home Health Agencies per Elderly Capita + ϕ_7Labor Force Part. Rate of Women + ϕ_8Chain + ϕ_9Beds per Elderly Capita + ϕ_7Urban + ϕ_8Percent Medicaid + ϕ_9Percent Medicare + ϕ_{10}Hospital Based + ϕ_{11}Per Capita Income + ϕ_{12}Family Group + ϕ_{13}Residents Group + ϕ_{14}Number of Beds

Percent Medicaid = α_1 + α_2Deficiencies + α_3Government Owned + α_4 Non-profit + α_5Chain + α_6 Beds per Elderly Capita + α_7Urban + α_8Percent Medicare + α_9Hospital Based + α_{10}Herfindahl + α_{11}Percent of Elderly on SSI in Market + α_{12}Number of Beds

Percent Medicare = β_1 + β_2Deficiencies + β_3Government Owned + β_4 Non-profit + β_5Chain + β_6 Beds per Elderly Capita + β_7Urban + β_8Percent Medicaid + β_9Hospital Based + β_{10}Herfindahl + β_{11}Percent of Veterans in Market + β_{12}Number of Beds

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[40] In addition, it is possible that the disability level of the residents in the home and the level of quality may be simultaneously determined.

[41] Medicaid or Medicare residents may be more disabled than other payer types, affecting the disability level of the nursing home population as measured by the case-mix index.

$$\begin{aligned}\text{Case-Mix} = {} & \delta_1 + \delta_2\,\text{Percent Medicaid} + \delta_3\text{Percent Medicare} + \delta_4\text{Primary Diagnosis 1} + \\ & \delta_5\text{Primary Diagnosis 2} + \delta_6\text{Primary Diagnosis 3} + \delta_7\text{Primary Diagnosis 4} + \\ & \delta_8\text{Primary Diagnosis 5} + \delta_9\text{Primary Diagnosis 6} + \delta_{10}\text{Primary Diagnosis 7} + \\ & \delta_{11}\text{Primary Diagnosis 8} + \delta_{12}\text{SCU1} + \delta_{13}\text{SCU2} + \delta_{14}\text{SCU3} + \delta_{15}\text{SCU4} + \\ & \delta_{16}\text{SCU5} + \delta_{17}\text{SCU6} + \delta_{18}\text{SCU7} + \delta_{19}\text{SCU8} + \delta_{20}\text{SCU9} + \delta_{21}\text{Goverment} \\ & \text{Owned} + \delta_{22}\text{Non-profit} + \delta_{23}\text{Chain} + \delta_{24}\text{Hospital Based.}\end{aligned}$$

Returning to the discussion of the exogenous variables in the quality equation shown above, some authors, such as Scanlon (1980), have argued that non-profit and government run homes may be more inclined to provide patients with higher quality care.[42] If they increase quality more than for-profit homes, the coefficients on the non-profit and government ownership variables will be positive.

Nursing homes that are part of a chain may provide higher quality than non-chain affiliated nursing homes, given that chains may have an incentive to enforce minimum quality levels in an effort to establish a chain-wide reputation. However, anecdotal evidence indicates that chain affiliated homes provide lower quality, a characteristic that is often attributed to chains' weak ties to the community. The degree of market concentration has a potentially important effect on quality given that firms with fewer competitors may not need to provide the same level of quality as firms operating in less concentrated markets. However, the effect of market concentration on quality need not be negative. Nursing homes in more concentrated markets may have a higher level of quality if there is a "cleaner" signal provided by increased quality when the consumer has fewer nursing home options to consider.

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[42] As mentioned above, however, it may be shown that utility maximizing non-profit nursing homes, who wish to provide higher quality care, will act like profit maximizing nursing homes by charging the profit maximizing price and using the returns to increase quality.

Substitutes for skilled nursing facility care, such as home health agencies and women not in the labor force, may play an important role in the level of quality provided by allowing individuals to substitute away from poor quality care. As discussed above, nurses provide both individualized attention and medical expertise. If the individualized attention aspect of the nursing-related quality measure is more important than the medical expertise aspect of the nursing-related quality measure, then the availability of women to care for elderly in the community may be important. However, if the medical expertise aspect dominates, then women not in the labor force may not serve as a good substitute for nursing home care. For home health agencies, this effect is less of a concern given that, as a population, home health workers have more medical expertise than females that are not in the labor force.

Individuals in counties with a higher per capita income level may have a taste for higher quality. Cohen and Spector (1996) reveal that RN intensity is increasing in county level per capita income. Turning to the Urban binary variable, Nyman (1985) argues that big city homes may be prone to more fraudulent behavior than homes outside of the city. The presence of an organized family or resident group in the home may serve to increase quality of care, as may the size of the nursing home if economies of scale in quality provision are present. The number of beds per elderly capita serves as a proxy for the restrictiveness of CON policies, which may affect quality through decreasing competition in the market.

Table Seven: Quality Estimates-Registered Nurse Hours

Variable	2SLS	2SLS
Constant	0.28165	0.40553
	(1.54)	(1.35)
Case-mix (Thoms)	-0.00079	
	(1.17)	
Case-mix (Katz)		-0.04643
		(0.97)
Government Owned	-0.01255	-0.01024
	(0.40)	(0.32)
Non-profit	-0.04840 *	-0.04627 *
	(2.83)	(2.80)
Herfindahl	0.07083	0.06439
	(1.55)	(1.40)
Home Health Agencies	-25.05832	-24.67344
	(1.30)	(1.28)
LFPR of Women	0.00037	0.00013
	(0.47)	(0.16)
Chain owned	-0.02950 *	-0.02782 *
	(2.24)	(2.0)
Beds per elderly	0.01296	-0.00056
	(0.09)	(0.0)
Urban	-0.01421	-0.01519
	(0.58)	(0.62)
Percent Medicaid	-0.03176	-0.05339
	(0.32)	(0.50)
Percent Medicare	0.17123	0.13741
	(0.79)	(0.62)
Hospital based	0.23487 *	0.23913 *
	(2.79)	(2.83)
Per Capita Income	0.00000	0.00000
	(1.58)	(1.27)
Family Group	0.00026	0.00071
	(0.02)	(0.05)
Resident Group	-0.02082	-0.01993
	(1.27)	(1.22)
Number of beds	-0.00092 *	-0.00089 *
	(2.63)	(2.52)
Number of observations	619	618
R-squared	0.61	0.61
R-squared, first stage	0.56	0.56

Notes: The values in parantheses are t-statistics. * indicates significance at, at least, the 5% level.

Table Eight: Quality Estimates: Inspection Violations

Variable	2SLS	2SLS
Constant	-0.08779	-0.16997
	(0.55)	(0.54)
Case-mix (Thoms)	0.00055	
	(0.93)	
Case-mix (Katz)		0.03388
		(0.73)
Profit	0.00790	0.00500
	(0.15)	(0.11)
Non-profit	-0.02039	-0.02163
	(1.22)	(1.24)
Herfindahl	-0.05437 *	-0.04660
	(1.94)	(1.55)
Home Health Agencies	-24.97514 *	-24.84725 *
	(2.67)	(2.57)
LFPR of Women	0.00015	0.00032
	(0.27)	(0.51)
Chain owned	-0.01309	-0.01445
	(1.06)	(1.23)
Beds per elderly	-0.05037	-0.03415
	(0.57)	(0.40)
Urban	-0.01895	-0.01768
	(0.94)	(0.87)
Percent Medicaid	0.15682 *	0.16188 *
	(2.09)	(1.71)
Percent Medicare	0.43687 *	0.44087 *
	(2.20)	(1.97)
Hospital based	-0.09937	-0.09544
	(1.07)	(0.98)
Per Capita Income	0.00000	0.00000
	(1.19)	(1.12)
Family Group	-0.02089 *	-0.02111 *
	(2.96)	(2.67)
Resident Group	-0.00724	-0.00825
	(0.61)	(0.71)
Number of beds	-0.00031	-0.00036
	(0.93)	(1.09)
Number of observations	615	615
R-squared	0.26	0.26
R-squared, first stage	0.27	0.28

Notes: The values in parantheses are t-statistics. * indicates significance at, at least, the 5% level.

Table Seven and Table Eight contain two-stage least squares of the two quality indicators: the number of deficiencies per patient day and the number of RNs per patient day, respectively. In the two stage least squares estimation outlined above, two specifications were run using all nursing labor as a third quality measure. In all cases, the R-squared in the first stage was less than .1, and the R-squared in the second stage was negative. Thus, only the results for the remaining two quality measures are presented and considered. As outlined above, the endogenous variables in the system include quality, the proportion of Medicaid residents in the home, the proportion of Medicare residents in the home, and case-mix. Exogenous variables used as instruments in the simultaneous equations estimates include the following: for-profit, non-profit, chain, beds per elderly capita, urban, hospital based, Herfindahl index, proportion of elderly on SSI, proportion of elderly veterans, eight out of nine primary diagnosis indicators, the number of home health agencies per elderly capita, the female labor force participation rate, per capita income in the county, the proportion of beds in the home dedicated to each of nine special care units, family group indicator, resident group indicator, and nursing home size.[43] Hausman tests for endogeneity indicate that the hypothesis that ordinary least squares provides consistent and efficient estimates cannot be rejected.[44]

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[43] Given that the Veteran's Administration pays for nursing home care for veterans, the number of elderly veterans should be negatively related to the proportion of Medicare funded residents in the county. The presence of an organized family or resident group in the home may serve to increase quality of care by serving as monitoring mechanisms.

[44] When conducting the Hausman test, the null hypothesis is that OLS is consistent and efficient. The Hausman test is for endogeneity of regressors is conducted by first obtaining the vector of coefficients and the estimated asymptotic variance from both the OLS and 2SLS estimates, (B_{OLS}, V_{OLS}) and (B_{2SLS}, V_{2SLS}), respectively. The Hausman test statistic is calculated as follows: $H = (B_{OLS} - B_{2SLS})' \, \mathrm{inv}[V_{OLS} - V_{2SLS}] \, (B_{OLS} - B_{2SLS})$. If the test statistic exceeds the critical value in the chi-squared table, the null hypothesis that OLS yields consistent estimates is rejected.

The signs of the estimated coefficients on the proportion of Medicaid patients on quality are consistent across quality measures; increasing the percentage of Medicaid patients in a nursing home decreases the number of RNs per capita and increases the number of deficiencies per capita. In other words, a more Medicaid-intensive population is associated with lower quality as measured by RNs per capita. However, the coefficients in the RN specification are not significant. The lack of significance may result from the requirement that nursing homes use a registered nurse at least eight consecutive hours a day seven days a week. The negative relationship between RNs per capita and the percentage of Medicaid patients in the nursing home may be related to the fact that Medicaid patients, who are less likely to be recovering from a hospitalization and are more likely to have long nursing home stays, may require fewer contact hours than other patient types.

The results across other control variables differ in significance according to the quality measure. Examining Table Seven, contrary to conventional wisdom, non-profit homes use significantly fewer RNs per resident than for-profit homes, all else equal. One might argue that staff turnover, which may be lower at non-profit homes, is a better indicator of quality than staff per patient, but staff turnover data is not available for Florida nursing homes. The results also reveal that chain owned homes employ fewer RNs per resident than non-chain affiliated homes. This finding is consistent with federal data showing that chains have higher-than-average rates of reported neglect and abuse (Peterson and Stanley 1998). Finally, larger homes utilize fewer RNs per resident and hospital based skilled nursing facilities have more RNs than other nursing homes. The impact of size on the number or RN hours per capita may be a function of OBRA 87, which requires each nursing home to have one registered nurse on the premises 24 hours a day seven days a week. Thus, larger homes are required to have fewer RNs per capita. Given that nursing homes may be viewed as less desirable places to work than hospitals, hospital based nursing homes may face a larger supply of RNs at each wage rate, allowing them to hire registered nurses at a lower wage than nursing homes.

In Table Eight, where the quality measure is the number of inspection violations, or deficiencies, per resident day, the presence of home health agencies in the market and the presence of an organized group for families of residents in the nursing home both decrease the number of deficiencies in the nursing home, i.e. increase quality. Thus, substitutes and monitoring increase nursing home quality. Like the percentage of Medicaid residents, the percentage of Medicare patients in a home is associated with lower quality. This relationship may result from a relatively weak link between quality and price when the government is paying. Finally, nursing homes in more concentrated markets have higher quality levels.

The finding of lower quality in homes with a lower proportion of private-pay residents may be partially attributed to private-pay patients demanding higher levels of quality that lead to higher prices for nursing home care. It should be noted that this lower level of quality, as measured here, should not necessarily be viewed as inefficient. It may be the case that Medicaid patients are less likely to recover, which means that they may be less likely to benefit from increased expenditures on RNs or from the correction of deficiencies, or it may be that taxpayers are not willing to pay for high quality care for state-funded nursing home residents.[45]

In summary, the potential explanation for the divergence in average payment rates, that Medicaid recipients are receiving lower quality care in the same nursing home is supported given the probability of death estimates. Further, the results show that homes with fewer private-pay residents are of generally lower quality.

Explanation Three: Medicaid Recipients are Recipients of Lower Cost Care in the Same Home or Medicaid Recipients are Congregated in Low Cost Homes

A third set of explanations for the divergence in average rates is as follows: Medicaid recipients are congregated in less expensive homes or are the recipients of lower cost care in the same home.[46] The first part of this hypothesis, that Medicaid recipients are congregated in lower cost homes, may be tested using Florida data on costs of individual nursing homes. Cursory evidence of the congregation of Medicaid recipients in less expensive homes is found when examining the median costs per resident per day for three groups of skilled nursing facilities: high Medicaid, mid-level Medicaid, and low Medicaid. The values by year are given in Table Nine.[47] High Medicaid homes are those in which ninety percent or more of the population is funded by Medicaid. Low Medicaid homes are those with twenty percent or fewer Medicaid

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[45] Higher quality of care for Medicaid residents may lead to both an increase in demand for Medicaid funded care and a higher cost per day for that care.

[46] If all nursing homes were operating efficiently, one could assume that increased costs imply increased quality. However, Vitaliano and Toren (1994) find that the average level of inefficiency in New York nursing homes is 29%, and Kooreman (1994) finds that only half of all Dutch nursing homes are fully efficient. Both of these results suggest that nursing homes may not be operating efficiently.

[47] The cost values in the table are not adjusted for inflation.

Table Nine: Median Costs per Resident per Day by Proportion of Medicaid Residents

YEAR	0-20% Medicaid	20-90% Medicaid	90-100% Medicaid
1986	$132.77	$117.62	$96.63
1987	$161.83	$116.55	$101.64
1988	$173.64	$118.57	$106.70
1989	$185.56	$119.12	$100.37
1990	$192.92	$120.74	$103.64
1991	$227.30	$124.11	$99.49
1992	$238.79	$125.34	$99.66
1993	$265.44	$125.09	$99.49
1994	$336.90	$124.54	$101.24
1995	$412.36	$126.06	$91.66
1996	$459.26	$127.20	$96.43

patients. The middle group falls between these extremes.[48] Clearly, in every year, the median home in the low Medicaid category always has costs per resident greater than the median nursing home in the middle category, which always has greater costs than the median home in the high Medicaid proportion group.

The second hypothesis, that cost of care delivered to Medicaid recipients within a given home is less than the cost of care administered to other patient types, may be examined by returning to the cost function estimates. Controlling for case-mix and quality, the estimated marginal cost of Medicaid care for a home with average characteristics is $31.68. In contrast, the estimated marginal cost of private care is $39.67.[49] Thus, at the margin, Medicaid residents are less costly than private-pay residents.

Explanation Four: Medicaid Residents Are Less Disabled

Turning to the fourth possible explanation of a divergence in rates between private-pay and Medicaid patients, Little suggests that Medicaid patients may be less disabled than private-pay patients. To receive Medicaid, individuals must spend down to a state-designated level of assets, which is very low. Thus, those with larger medical expenses are more likely to spend down to the Medicaid level. Given that those with larger medical bills are also likely to be in relatively poor health, the third potential explanation presented by Little has little intuitive appeal. However, the data allows for a formal exploration of the relationship between case-mix and the percentage of Medicaid recipients in a home.

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[48] The choice of cutoffs, while admittedly rather arbitrary, is based upon cutoffs used by the state agency responsible for nursing home reimbursement rate-setting, where, from 1993-1995, cost reduction incentives weights were set at zero for nursing homes with twenty percent or fewer Medicaid patients and were set at one for nursing homes with ninety percent or more Medicaid.

As with the quality estimates, there is a potential simultaneity problem given that the proportion of Medicaid patients in a home may increase the debility level in a home and the debility level in a home may make the nursing home less attractive to potential private-pay residents. The Hausman test for endogeneity leads to a failure to reject the null hypothesis, which states that OLS is consistent and efficient. However, the value of the Hausman test statistic may be biased downward given the poor fit in the first stage of the 2SLS estimates. Given that the test statistic leads to a failure to reject the null, both sets of estimates, the two-stage least squares and the ordinary least squares estimates, are presented in Table Ten.

Examining the OLS estimates, the coefficients on the proportion of Medicaid residents are negative and significant. The two-stage least squares coefficient estimates have the opposite sign but are not significant. Given the low R-squared values for both stages of the two-stage least squares estimates and for the OLS estimates, the results should be considered with caution. Turning to the other explanatory variables, the percentage of residents with a given primary diagnosis upon admission and the presence of special care units within the home explain some of the variation in case-mix. Moreover, non-profit homes have significantly lower case-mix measures (i.e., less disabled nursing home populations) than for-profit homes, and hospital based nursing

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[49] The difference between these values is statistically significant. For significance, a standard t-test was conducted after linearizing the function and fixing lambda at the estimated value. The test statistic was equal to 8.654.

Table Ten: Case-Mix Estimates

Variable	Thoms Index 2SLS	Thoms Index OLS	Katz Index 2SLS	Katz Index OLS
Constant	137.24620 *	155.02499 *	4.34286 *	4.76628 *
	(8.18)	(21.03)	(14.10)	(35.95)
Percent Medicaid	4.65849	-19.91854 *	0.04876	-0.56608 *
	(0.25)	(3.44)	(0.14)	(5.46)
Percent Medicare	-32.80359	-47.83586 *	-1.07054 *	-1.33874 *
	(1.33)	(5.66)	(2.37)	(8.84)
Primary Diagnosis 1	13.15643 *	7.91934	0.31684 *	0.18663
	(1.76)	(1.24)	(2.30)	(1.63)
Primary Diagnosis 2	11.91507	10.19649	0.60372 *	0.55791 *
	(0.65)	(0.56)	(1.81)	(1.70)
Primary Diagnosis 3	-10.67643	-4.22670	-0.30186	-0.10969
	(0.87)	(0.36)	(1.35)	(0.52)
Primary Diagnosis 4	-9.80527	-8.47979	-0.16651	-0.12024
	(0.68)	(0.59)	(0.63)	(0.47)
Primary Diagnosis 5	-1.72912	-1.96902	0.01245	0.00699
	(0.17)	(0.19)	(0.07)	(0.04)
Primary Diagnosis 6	30.92063 *	35.23268 *	0.26661	0.39161 *
	(2.35)	(2.71)	(1.10)	(1.66)
Primary Diagnosis 7	9.08905	8.03486	0.01093	-0.01328
	(1.02)	(0.91)	(0.07)	(0.08)
Primary Diagnosis 8	-0.48623	26.02173	-0.81107	-0.08194
	(0.01)	(0.72)	(1.15)	(0.13)
SCU-Dialysis	416.18104	400.31700	11.56802	11.19319
	(0.84)	(0.81)	(1.29)	(1.26)
SCU-Hospice	80.11296	85.84075	1.19844	1.31858
	(1.31)	(1.40)	(1.08)	(1.20)
SCU-Ventilator / Respiratory Care	91.25130 *	77.78097 *	1.07809	0.70790
	(2.21)	(1.91)	(1.43)	(0.97)
SCU-AIDS	-102.0956	-76.66082	-2.86549 *	-2.20378
	(1.23)	(0.93)	(1.89)	(1.50)
SCU-Disabled Child / Young Adults	77.19799	78.16091	0.26040	0.27555
	(0.87)	(0.88)	(0.16)	(0.17)
SCU-Head Trauma	136.86927	159.34677	3.00879	3.48257
	(0.62)	(0.72)	(0.75)	(0.88)
SCU-Huntington's Disease	168.10722 *	185.28294 *	0.31490	0.89522
	(2.07)	(2.29)	(0.20)	(0.59)
SCU-Other Special Rehabilitation	39.44923	32.54300	0.71029	0.51171
	(1.55)	(1.29)	(1.53)	(1.13)
SCU-Alzheimer's Disease	-6.33834	-10.75807	0.10561	0.01250
	(0.46)	(0.83)	(0.42)	(0.05)

Table Ten--continued

	Thoms Index		Katz Index	
Variable	**2SLS**	**OLS**	**2SLS**	**OLS**
Government owned	7.44081	8.04451	0.17990	0.20005 *
	(1.22)	(1.32)	(1.62)	(1.83)
Non-profit	-10.56143 *	-9.82995 *	-0.15247 *	-0.13146 *
	(3.55)	(3.32)	(2.82)	(2.48)
Chain owned	2.05908	3.28473	0.06007	0.09824 *
	(0.83)	(1.40)	(1.33)	(2.34)
Hospital Based	26.17505 *	25.20607 *	0.52963 *	0.43577 *
	(2.42)	(4.20)	(2.69)	(4.06)
Number of observations	619		618	
R-squared	0.11	0.14	0.17	0.17
R-squared, first stage	0.14		0.17	

Notes: The values in parantheses are t-statistics. * indicates significance at, at least, the 5% level.

homes have higher case-mix measures. In summary, when examining the estimated coefficients on the proportion of Medicaid residents in the home, it is clear that there is no conclusive evidence that Medicaid residents are more disabled than other patents.

Conclusions

Recounting the direct evidence of cross-subsidization, when examining the average incremental cost for each facility, it is apparent that only about one-quarter to one-third of Florida's nursing homes are subsidizing Medicaid residents. Furthermore, the apparent cross-subsidization across payer types may not be explained away by resident level intertemporal price discrimination. When one does not control quality and costs, the facility level difference between the private-pay rate and the Medicaid rate does not grow with an increase in the proportion of Medicaid residents in a home. However, given facility specific average incremental cost estimates, which control for costs and quality, one may estimate the effect of net revenue from Medicaid patients on the self-pay price markup for nursing homes that are identified as cross-subsidizers. The results reveal that increasing net revenue from Medicaid patients results in a smaller self-pay price markup in cross-subsidizing nursing homes.

Turning to the differential quality explanation for the difference in average rates, the probit estimates of probability of death suggest that Medicaid residents may be receiving lower quality of care than other residents within the same skilled nursing facility, and an increased proportion of Medicaid residents in a nursing home is associated with lower quality. In terms of the cost explanations, Medicaid residents are clustered in low cost homes, and the estimated marginal cost of a Medicaid resident day is less than the estimated marginal cost of other patient types. Finally, there is inconclusive evidence regarding the disability level of Medicaid funded nursing home residents.

Some nursing home providers are not being paid enough by the State of Florida to cover the marginal cost of care for Medicaid residents, resulting in cross-subsidization among payer types. Cross-subsidization is undesirable for several reasons. First, charging higher rates to private-pay residents may encourage middle-income people to shelter assets or hasten the transition of middle-income private-pay residents to Medicaid payer status. Clearly, policy makers must consider whether it is more equitable to tax the general population less and pay nursing homes lower Medicaid reimbursement rates or to impose a "tax" on other nursing home residents to fund care for state-funded residents. Perhaps more importantly, the price distortions created by cross-subsidization change the patterns of consumption in welfare-reducing ways. Providing reimbursement rates for Medicaid residents that are comparable to self-pay rates would end the inequity and inefficiency associated with transfers from self-pay residents to Medicaid residents.

The analysis also reveals that Medicaid residents are clustered in low cost and low quality homes, Medicaid residents are less costly at the margin, and Medicaid residents *may* be receiving a lower level of quality than other residents within the nursing home. While the state does not appear to being paying too much for nursing home care, when nursing homes are operating efficiently, there is a direct and negative relationship between costs and quality. Low Medicaid reimbursement rates may be driving lower quality delivery to Medicaid residents, but, one cannot determine whether low cost service is worse than the alternative level of care that Medicaid funded recipients would receive in the absence of such a program. Given long-standing public concern about the quality of nursing home care, voters and state policy makers must decide whether the low cost care being provided to state-funded residents is worth the price of low quality for Medicaid patients. While policy makers may not be driven to change the regulatory framework when they have more information about its effects, the results clearly show the tradeoff between dollars and quality of care.

CHAPTER 3

THE IMPACT OF REGULATION AND COMPETITIVE FORCES ON NURSING HOME QUALITY, COSTS, AND ACCESS FOR MEDICAID PATIENTS

Introduction to Regulation in Nursing Homes

The model of nursing home behavior contained in Chapter One establishes a theoretical foundation that includes an Medicare, Medicaid, and private-pay residents, and Chapter Two provides empirical evidence regarding the hypothesis that Medicaid patients are being subsidized by other residents in the nursing home, which is one aspect of nursing home behavior. In this essay, nursing homes response to government regulation is considered. More specifically, the effects of Florida's Certificate-of-Need program and of changes in the Medicaid reimbursement rate methodology on nursing home quality, nursing home costs, and the proportion of Medicaid patients in the nursing home are considered.

Motivation for Regulatory Measures

In the political marketplace, regulation may serve several purposes. Regulation is often justified as a means of correcting market inefficiencies. This line of argument asserts that regulations are adopted to promote or protect the public welfare. This goodwill view of regulation focuses on public welfare, but it is not clear which programs or regulations will enhance public welfare. While most economists would argue that public welfare can best be enhanced by promoting economic efficiency, others argue that redistributing income is the best way to increase public welfare. Regulation may or may not accomplish either of these ends.

Regulations may also be sought by firms to protect them from competition. This argument asserts that an industry will seek to influence or "capture" regulators, so as to obtain regulations that benefit the industry. Another variation on this "capture theory of regulation" is more general. It argues that interest groups are both positively and negatively influenced by legislation, where the impact on groups is likely to be asymmetric. In an attempt to promote regulation that is consistent with positive outcomes for the interest group, the interest group with the most to lose will spend the most to attempt to "capture" the regulatory body. In this case, the interest group is not necessarily the industry; it may also be consumers or other groups (Stigler 1971, Posner 1974b, Peltzman 1976).

Why are regulatory agencies likely to become captured? One reason for this phenomenon is that regulatory agencies are often staffed by individuals who are experts on the regulated industry. Given that such individuals are likely to have worked in the industry or in agencies with power over the industry in the past, they are likely to sympathize with the industry. A second factor increasing the likelihood of capture is that experts from regulatory agencies often find that their experience at the agency allows them to command a higher wage upon leaving the regulatory agency and entering the regulated industry.[50] These job prospects may cause regulators to view the industry in a more favorable light. A final support for the capture theory involves the limited funding under which regulatory commissions operate. Regulatory entities may depend on the regulated industries to cover some of their expenses, which creates an incentive to allow the industries to earn above normal profits.[51]

Given that economic theory argues that regulatory entities may be captured by industries or may be working to enhance public welfare, the impact of regulation must be examined empirically. Several authors have examined regulation in different industries and under varying regulatory mechanisms. Examples of areas examined include occupational licensing and the regulation of railroads, trucking, construction, and shipping. In this essay, the regulation of nursing homes is considered.

While medical care in general is subject to a fair amount of regulation, nursing homes may be considered a special subset of health regulation. Nursing homes differ from hospitals and the provision of services by physicians in the following area: the link between physician interests and the provision of care. Given that physicians generally do not have ownership interest in nursing homes, the incentive to recommend a given home or to recommend nursing home care when unnecessary is effectively eliminated.[52] However, physicians do have ownership in hospitals, some of which have skilled nursing beds.

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[50] Florida requires that all nursing home administrators be licensed by the state. When investigating the requirements associated with the licensure process, no written evidence that potential nursing home administrator licensees benefit from government agency work experience was found. However, the complexity of the nature of the reimbursement mechanisms for Medicare, Medicaid, and other regulations leads one to believe that there is a considerable amount of industry-specific knowledge that is acquired when working for the industry or for a government agency that regulates the industry.

[51] For examples of these three phenomena, see Carlton and Perloff (1994).

Nursing Homes and Health Regulation

Nursing home care also differs from general health care in the time that individuals have to gain information about the quality of the nursing home care. It is easier for consumers to make judgements about the quality of nursing homes from ex-ante personal observation. In other words, most doctor's offices look similar. In contrast, observation of a nursing home will reveal physical attributes that are likely to vary across homes, such as cleanliness and odor, and will reveal attributes related to patient treatment, such as whether residents are engaged in activities or whether patients are wandering around the home unattended. In addition, the Agency for Health Care Administration (AHCA), a part of Florida's state government, publishes a summary of nursing home characteristics for use by the general public. Included in this report are rates for service per day and ratings based on annual nursing home inspections. Additionally, the demand for nursing home care is generally less urgent than the demand for treatment in acute care settings, allowing for direct consumer search.

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[52] In their paper, Mitchell and Scott (1992) found that joint venture ownership of nursing homes in Florida has little impact on the measures of access, costs, charges, and utilization reported. While there are regional variations, the regional influences do not significantly affect costs, charges, and utilization of services given the influence of joint venture ownership. In terms of access, smaller joint venture nursing homes generate more revenues from Medicaid patients than their nonjoint venture counterparts. Further,

Two other factors that set nursing home care apart from health care in general are the prevalence of for-profit entities and the lack of private insurance. Given that approximately 80 percent of all nursing home beds nationally and in Florida are in for-profit facilities, there are likely to be considerable incentives to minimize costs and inefficiency in an effort to maximize profits.[53] While private nursing home insurance coverage has seen significant growth over the past decade, only about two percent of all expenditures on nursing homes are funded by private insurance. In 1996, nationally, 59.2 percent of nursing home care was paid for by Medicare and Medicaid, and most of the remaining 40 percent of care was paid for privately, with patient or family funds. In terms of patient days, Medicaid funded approximately 65 percent of all nursing home care nationally in 1996.

Payer Types in Nursing Homes

As discussed in Chapter One, in nursing homes there are only three major payer types: private-pay, Medicaid funded, and Medicare funded. Private-pay residents or their families pay for nursing home expenses without any government assistance. The Medicaid program covers long-term care for the poor, where Medicaid residents must meet the eligibility standards set forth by the Social Security Administration. Under the Medicaid program, a nursing home is reimbursed per day for each Medicaid funded

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measures of profitability show that all nursing homes in their study, regardless of size and ownership status, have modest rates of profit.

resident, where the rate varies by facility but each nursing home is paid the same daily reimbursement rate for each Medicaid funded resident, regardless of the disability level of each resident. The third major payer for nursing home care is the Medicare program, a federal program that funds medical care for the elderly and pays for convalescent or terminal, not long-term, skilled nursing facility care. Medicare nursing home coverage is currently limited to 100 days, and it requires prior hospitalization and a physician established need for skilled nursing services.

Table Eleven contains information concerning the proportion of nursing home resident days by payer type from 1986-1996 in Florida. Note that the proportion of Medicaid funded resident days in Florida's nursing homes remained relatively constant over the decade. In contrast, the proportion of Medicare funded resident days increased from two percent to twenty percent, and the proportion of privately funded nursing home days decreased from forty to twenty-two percent. Clearly, the burden on the Medicare program increased over the period, while fewer resident days were funded out-of-pocket by residents or their families.

Just as there have been changes in the proportion of different payer types in nursing homes over the past decade, there have been changes in the revenue stream from each patient type. Table Twelve, which contains information regarding the proportion of revenue from each major payer type, reveals that the proportion of revenue from Medicaid residents has decreased over time. Thus, Medicaid revenue declined over the

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[53] Some authors contend that non-profit entities also have incentives to maximize profits given that higher profits mean more money to redistribute to the medically needy. See Scanlon (1980) and Morrisey (1994).

Table Eleven: Proportion of Residents by Payer Type

Year	Proportion of Medicaid Residents	Proportion of MedicareResidents	Proportion of Private and Other Residents
1986	58%	2%	40%
1987	60%	2%	38%
1988	62%	2%	36%
1989	60%	7%	33%
1990	62%	8%	30%
1991	64%	7%	29%
1992	65%	8%	27%
1993	65%	9%	26%
1994	63%	13%	24%
1995	59%	18%	23%
1996	58%	20%	22%

Table Twelve: Proportion of Revenue by Payer Type

Year	Percentage of Revenue from Medicaid	Percentage of Revenue from Medicare	Percentage of Revenue from Private and Other
1986	52%	4%	44%
1987	53%	4%	43%
1988	55%	4%	41%
1989	53%	11%	36%
1990	53%	12%	34%
1991	55%	12%	33%
1992	55%	15%	30%
1993	52%	20%	29%
1994	48%	25%	27%
1995	43%	31%	26%
1996	41%	34%	25%

period while the proportion of Medicaid residents in nursing homes remained relatively constant. Not suprisingly, the proportion of revenue from Medicare residents has been increasing over time.[54] The proportion of total revenue coming from private-pay residents was approximately equal to the proportion of private-pay residents in Florida nursing homes over the period.

Certificate-of-Need Regulation

Medicaid is one of the fastest growing budget items for many state governments.[55] In Florida, for the 1997-1998 fiscal year, the state budget for Medicaid was $6.9 billion, with approximately 25 percent of that amount, approximately $1.7 billion, dedicated to funding long-term nursing home care. State governments have implemented regulations in an effort to stem the growth of costs in nursing home payments. One such policy has been limitations on the number of nursing home beds.

Before an individual or corporate entity may be granted a license by the State of Florida to operate a nursing home, hospital, home health agency, intermediate care facility, or hospice, the person must apply to the state's Agency for Health Care Administration and must be awarded a certificate that indicates the state's recognition of a need for such a health care facility or service in a market area, where the certificate is called a Certificate-of-Need. CON regulation in Florida began in the early 1970s as a result of federal legislation, which was intended to curb rapidly escalating health care costs. The federal CON program was repealed in 1981, but Florida's CON program for nursing homes remains in effect. The state's CON program is centered around three stated policy goals: cost containment of overall health care expenditures, ensuring a minimum level of quality of health care, and ensuring access to health care goods and services.[56]

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[54] The dramatic increase in Medicare payments from 1988-1989 resulted from the passage of the Medicare Catastrophic Coverage Act. The act was repealed after total Medicare expenditures increased by a factor of 2.7 and Medicare covered skilled nursing facility days increased by a factor of four. The act increased the number of skilled nursing facility days covered from 100 to 150 and it removed the three day hospitalization stay requirement. The act also served to clarify the Medicare reimbursement guidelines for skilled nursing facility care. For a more in-depth discussion, see Intrator, Mor, Hines, Lancaster, Laliberte, and Frieberger (1996).

Compared to other states, Florida has a low nursing home bed to elderly (age 65+) population at 76.7 skilled nursing facility beds per 1000. Nationally, the average bed to population ratio is 133.1.[57] To operate a skilled nursing facility, or nursing home, in Florida, an individual must obtain a CON that states that there is a need for a new, converted, expanded, or otherwise significantly modified nursing home in the area. To calculate the need for increased facility capacity or service availability in a geographic area of the state, the CON Office obtains utilization data from health care facilities and health care providers, which it uses to track market developments in terms of the cost of services delivered, the level of service utilization, and health care consumer demographic

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[55] Medicaid is a state-federal matching program, where over half of all Medicaid dollars are provided by the federal government.

[56] Florida Senate, Committee on Health Care, Certificate-of-Need Program Medicaid Conditions on Nursing Home Beds, Interim Project Report 97-P-28, August 1997, p.2.

[57] In 1995, Florida had 678 nursing homes, 2340 residential facilities for the elderly, and 1912 home health agencies. Florida's relatively low number of beds per elderly capita may be appropriate if Florida's elderly population is more healthy than the national average. Arizona, which, like Florida, has a relatively large number of elderly in-migrants, also has a relatively low nursing home bed to elderly ratio, but it is not as low as Florida's.

profiles. The CON Office provides funding from CON fees to eleven local health planning councils established in the state.

The local health councils provide the CON Office with data on local Medicaid utilization and provide the CON Office with preference statements for the award of CONs. As discussed in the literature review, denial of nursing home services to Medicaid recipients has been attributed to the differential between provider costs and Medicaid reimbursement rates. Through the CON program, the state has developed a mechanism to ensure access for some Medicaid eligible nursing home residents. Under Florida statute, AHCA is given that authority to impose a condition on a legal person applying for a CON for nursing home beds to certify a specified number or percentage of those beds for use by Medicaid recipients.[58]

Preference statements may be expressions of preference for applicants agreeing to serve a specified percentage of Medicaid patients or agreeing to meet some other requirement. The following are examples of preferences: an applicant who commits in its application to maintaining at least the subdistrict's percentage of Medicaid patients, an applicant who agrees to provide a minimum of thirty percent Medicaid patient days, an applicant who commits to the provision of service to Medicaid patients, or no preference. Statements of preference are included in the CON application packet. The CON Office reported that at least for the past ten years, it has not awarded a nursing home CON that did not impose a condition that the applicant certify a portion of its beds for Medicaid reimbursement.[59] However, some nursing homes in Florida have used litigation to remove CON conditions related to the proportion of Medicaid residents in the home.

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[58] In 1981, the Legislature enacted authority for the CON Office to impose conditions on those awarded a CON for nursing home beds.

AHCA's administrative rules dictate that the future need for skilled nursing beds shall be determined twice a year and published by the agency. The planning horizon for applications is approximately three years from the application submission date. When reviewing applications, AHCA considers the applicant's ability to provide quality of care by examining the following factors:

1. whether the applicant has had a nursing home license denied, revoked, or suspended within the 36 months prior to the application,
2. whether the applicant has had a nursing home placed in receivership at any time during the period of ownership, management, or leasing of a nursing home in the 36 months prior to the application,
3. the extent to which the conditions identified in factors 1) and 2) threatened or resulted in direct, significant harm to the health, safety, or welfare of nursing home residents,
4. and the extent to which the conditions identified in 3) were corrected within the time frames allowed by the appropriate state agency in each respective state and in a manner satisfactory to the agency.

Fees are required for processing applications, based on a $5,000 minimum plus $0.015 for each dollar of proposed capital expenditure, with the total fee not to exceed $22,000. Fees must be submitted with the application. Thus, firms have an incentive not to apply for a CON unless there is a reasonable chance of being awarded the CON. However, examination of CON application data reveals that only approximately thirty percent of all nursing home related CONs were approved from 1986-1996.

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[59] Florida Senate, Committee on Health Care, Certificate-of-Need Program Medicaid Conditions on Nursing Home Beds, Interim Project Report 97-P-28, August 1997, p.4.

Under Florida statute, AHCA is responsible for monitoring functions relating to the construction of projects and conditions placed on CONs and for the imposition of penalties for noncompliance. AHCA has allocated one full-time equivalent position to monitor compliance. Monitoring of conditions began in 1989. Between 1989 and 1995 a total of 3,600 CONs were reviewed through the compliance monitoring system. During that period, 64 percent were found to be in substantial compliance when reviewed. As of 1997, there were 364 nursing home CONs and 20 hospital skilled nursing unit CONs with conditions being monitored by AHCA.[60] Failure to comply with a CON condition may subject the certificate holder to an administrative fine of up to $1,000 per failure per day. As of July 1997, the CON Office had collected over $246,000 since the conception of the monitoring program.

Limitations on beds and new construction as a result of CON legislation have been charged with creating several problems. First, the restrictions of new construction and bed addition caused by CON laws have been blamed for excess demand in many geographical areas and for increases in prices paid by self-pay and/or Medicare nursing home residents. Nationally, average occupancy rates are 95.4 percent (Ettner 1993), while average occupancy rates in Florida are currently a bit lower at 91 percent.

The public interest justification for CON regulation is generally based upon the belief that unregulated competition will result in the construction of unnecessary facilities. However, it is possible that CON regulation could be used to assure that minimum quality standards are met by health care providers or used to ensure a supply of beds for Medicaid funded residents.

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[60] For reference, in 1997 there were 665 skilled nursing homes and 65 hospital based skilled nursing units, which are made up of beds licensed for delivery of skilled nursing services.

Hospital CON Literature

Most of the literature concerning CON regulation deals with the issue of duplication of facilities, particularly in the market for hospital care. In his essay, Posner (1974a, p. 114) argues that CON laws that result in controls on construction in an industry, "...often serve to reinforce cartelization among the regulated firms....Control of construction can be used to limit expansion of output. If the cartel dominates the regulatory agency, as is unfortunately often the case, construction will not be permitted where the result would be over capacity from the standpoint of maximizing cartel profits." He also adds that, "An even more important anti-competitive consequence of construction controls is that they provide a means of barring new entry into the cartelized industry"(Posner 1974a, p. 115).

Joskow also considers the issue of CON regulation in his 1981 book. He describes CON policies similar to those enacted in Florida as focusing primarily on facility duplication, or efficiency loss due to failure to exploit economies of scale. He posits that one should expect CON policies similar to those implemented in Florida to be successful at reducing the most egregious departures from minimum cost production resulting from facility duplication; however, the cost saving opportunities are expected to be small and will be reduced by the administrative costs of the regulation. In addition, Joskow argues that the CON agency may be inclined to use its formal authority to extend its authority beyond the boundaries of the statute. In Florida, for example, the CON guidelines specify that quality of care and access for Medicaid residents may be considered when evaluating CON applications. Wendling and Werner (1980, p. 8) argue that CON policies may be used to control entry and/or limit expansion of services and that such a policy is laudable if it allows for cross-subsidization among services provided, "Control of entry is essential to internal subsidization in order to protect remunerative services, which are used to subsidize unremunerative services, from competitive erosion."

Hypothesized Effect of Nursing Home CONs on Quality, Access, and Costs

In the case of nursing home CONs, the primary goal is clearly to restrict the number of nursing home beds in the state. Why? There are several possible explanations. First, the desire of individuals to choose a nursing home that is located near relatives may result in a large number of relatively small nursing homes and efficiency loss due to failure to exploit economies of scale in the production of resident days. Although this argument most closely follows the justification for construction controls found in the hospital CON literature, consumer preferences for proximity to family should be weighed against potential efficiency gains from larger scale production.

In a monopolistically competitive market, the socially optimal amount of variety or number of goods may not coincide with the minimum average cost level of production. In fact, Spence (1976) shows that the range of services is likely to be suboptimally low in small communities. In their article, Dixit and Stiglitz (1977, p. 297) argue that, "With scale economies, resources can be saved by producing fewer goods and larger quantities of each. However, this leaves less variety, which entails some welfare loss." Carlton and

Perloff (1994) show that in an monopolistically competitive industry with differentiated products, average cost is always greater than marginal cost at the margin if consumer utility, *u*, is concave ($u'>0$, $u''<0$). In other words, the optimum level of production lies on the downward sloping portion of the average cost curve. This result holds as long at the average cost curves are U-shaped.

A second reason that regulators may choose to restrict the number of nursing home beds is that incumbent nursing home chains may wish to limit competition through the CON process. Arguing that this may be the case, Joskow (1981) notes that hospital associations were among the supporters of federal CON legislation. Third, the state may have an incentive to use the CON process to control the number of nursing home beds and, thus, the number of nursing home beds available to Medicaid funded nursing home residents.

A final explanation is that the CON process is used to award capacity to firms that commit to providing some minimum quality level or that commit to providing subsidized care to Medicaid residents. Note that these explanations for CON legislation are not mutually exclusive. By limiting the number of available beds, the state is able to limit the available beds to Medicaid funded patients and control state expenditures. Given that moral hazard problems are likely to exist with respect to publicly provided nursing home care, a bed construction control mechanism may serve to eliminate from the Medicaid rolls patients with other options, such as informal care by children.

In an effort to determine whether the CON program is meeting its legislated goals, facility level data will be used to analyze the impact of the restrictiveness of CON policy in a market area on quality of care, the proportion of Medicaid residents in a nursing home, and nursing home costs.[61] Turning first to the effect of CON policy on nursing home quality, registered nursing hours per patient and the number of deficiencies found during the annual nursing home inspection per patient are used to indicate quality.[62]

The direct result of control by the CON regulatory body on the supply of nursing home beds in Florida is the number of beds per elderly capita in the market area.[63] Thus, this variable indicates the effect of CON regulation on quality.[64] If fewer beds are located in a market, one might expect a decrease in quality resulting from less quality-based competition in the market in which CON policy is more restrictive. For example, if the population increases, while the number of nursing home beds remains fixed due to CON regulation, demand per firm will increase. As firms may not be able to fully respond to the demand increase by increasing price given fixed reimbursement rates, they may allow quality to deteriorate. In contrast, if CON regulators are successful in weeding out low quality firms through the CON approval process, markets in which the regulatory entity has not been as restrictive may have lower quality. In his paper, Leffler (1982) shows that output restrictions may result in an increase or decrease in quality depending on total costs and total value. Assuming that quantity rights are freely transferable and beginning from an initial competitive equilibrium, Leffler restricts quantity to $\overline{X}$, and the firm chooses the efficient quality level given the constraint. He then shows that quality can rise or fall, depending on the shapes of the total cost and total valuation curves.

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[61] The effect of the CON program on nursing home profits was also considered empirically. However, the fit of the regression line was very poor, and the coefficient on the CON policy variable was not significant. Thus, the results are not presented.

[62] Nyman (1985, 1989) has used violations of licensing laws as a proxy for quality. Braun (1991), Davis (1991), Kooreman (1994), Monroe (1990), and Zinn (1994) use registered nursing hours as measures of quality.

[63] As noted above, the number of beds per elderly capita may be affected by demand in the area. Nursing home owners may not be willing to construct homes in some rural, low-income areas. In such a scenario, the CON regulatory board may approve all CON applications for the market, but there may still be a limited number of beds per elderly capita.

[64] The use of alternative measures of CON restrictiveness was considered. Given data on CON applications and denials, one could construct a measure of CON restrictiveness, such as the proportion of CON applications approved in the market or the proportion of CON denials in the market. However, there is an inherent problem with using such measures given that potential CON applicant may attempt to gather information about his or her likelihood of approval prior to applying, particularly given the relatively high costs associated with applying for a CON. If this type of behavior is taking place, the percent approved or denied will not convey the proper information about the restrictiveness of the process.

Other variables that may affect quality of nursing home care include the following: market concentration; whether the nursing home is located within a Metropolitan Statistical Area (MSA); whether the nursing home is hospital based; per capita income in the market area; whether there is an organized resident's group in the home; whether there is an organized group for family members of nursing home residents affiliated with the nursing home; the size of the nursing home; whether the facility is for-profit, non-profit, or government owned; whether the establishment is part of a chain; the number of substitutes for nursing home care available in the market; and the proportion of Medicaid patients in the facility.

Turning to the issue of market concentration, quality of care may be higher or lower in more competitive markets, as shown in Leffler (1982). Leffler begins by setting up the monopolist's problem, where the monopolist chooses the level of output and quality. The first order conditions reveal that, given product quality, the monopolist reduces output from the efficient level. However, given output, the monopolist may increase or decrease quality. Leffler shows that a sufficient condition for quality to fall is independence between the level of output and the level of the unpriced attribute (total quality) *and* a linear marginal valuation of the unpriced attribute. He also points out that substitutability between the level of output and the level of the unpriced attribute does not ensure that quality will decrease in a less competitive market.

However, some authors have argued that increased concentration may provide lower costs for individuals gathering information about prospective nursing homes, causing quality to be higher in concentrated areas. A county level Herfindahl-Hirschman Index (HHI) based on nursing home output (measured by patient days produced in a given year) is used as the gauge of market concentration. Along similar lines, a binary variable indicating whether the firm is an MSA or not is included.[65]

Along with the number of firms located in an area, one must consider the ownership type of the nursing home as well as whether the nursing home is part of a chain. It is not clear how ownership type should affect quality, but anecdotal evidence suggests that non-profit firms may choose to funnel profits into quality-enhancing activities. Chain affiliated nursing homes may be subject to chain imposed quality minimums, set to protect the reputation of the chain. Monitoring and substitutes for nursing home care are hypothesized to increase quality. For example, the presence of an organized family or resident group in the home may serve to increase quality of care.

As measures of substitutes in the market, the number of home health agencies per person age 65 and over in the market and the labor force participation rate of women in the market are used. While home health agencies are clearly substitutes for nursing homes, the use of the labor force participation rate of women is deserving or further explanation. If more women in an area are participating in the labor force, there will be fewer women of working age with the time necessary to personally provide a high level of assistance for aging relatives in the home, necessitating the transition of more elderly into nursing homes.

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[65] The correlation between the HHI and the MSA binary is approximately -.76. Thus, multicollinearity may be introduced when both variables are included in the specification. To check for this, three versions of the quality and proportion Medicaid specifications were estimated using both variables, only the HHI, and only the MSA binary variable. For the quality estimates, the MSA binary is insignificant in both specifications, and the magnitude of the HHI coefficient decreased when the MSA binary was removed from the specification. The results presented in this dissertation include both variables.

Considering the payer variables, the larger the proportion of Medicaid and Medicare patients in a nursing home, the less sensitive the resident population may be to quality differences. In the model of nursing home behavior provided earlier, quality and payer-mix (resulting from the choice of the private-pay price) chosen by a nursing home are simultaneously determined. Just as quality may be affected by payer-mix in the nursing home, the quality level may determine the payer-mix. Nursing homes with more Medicaid patients may choose to provide lower quality, and lower quality may lead to lower private-pay and higher Medicaid populations.[66]

Besides affecting quality, CON regulations are allegedly intended to affect the proportion of Medicaid residents in a nursing home. As previously mentioned, one of the stated goals of the CON program is to ensure access to health care goods and services. Thus, CON policies should serve to increase the proportion of residents in nursing homes who are Medicaid funded.

The proportion of Medicaid funded residents may also be affected by the following: the quality of the nursing home, the ownership type, whether the nursing home is owned by a chain, whether the nursing home is located within an MSA, whether the nursing home is hospital based, the level of concentration in the market area, the proportion of elderly receiving Supplemental Security Income (SSI) in the market, the size of the nursing home in terms of beds, and the proportion of Medicare funded residents in the nursing home.[67]

As stated above in the discussion of the simultaneity problem, lower quality may lead to lower private-pay and higher Medicaid populations, and the proportion of Medicare patients in the home is linked to the proportion of Medicaid patients in the home. The ownership type of the nursing home, i.e. whether the nursing home is a for-profit, non-profit or government owned establishment, may impact the willingness of the nursing home to provide services to more needy residents in lieu of profits. Chain owned firms may be less likely to accept Medicaid patients. This proposition is supported by attempts to dump Medicaid residents by two large nursing home chains in Florida in 1998 (Chachere 1998). Nursing homes that are located in rural areas may have more Medicaid patients given lower per capita income in rural counties in Florida, and nursing homes in more concentrated markets may have more choice with regard to patient mix given restrictions on the supply of nursing home beds. As Medicaid is a program that funds long-term care for the poor, one would expect nursing homes in markets with a higher

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[66] In addition, it is possible that the disability level of the residents in the home and the level of quality may be simultaneously determined.

[67] As mentioned previously, three versions of the proportion Medicaid specification were estimated, where one included both the HHI and the MSA binary, one included only the HHI, and one included only the MSA binary. The magnitude and significance of the HHI coefficient does not change when the MSA binary is removed, but the MSA coefficient does become significant when the HHI is removed. The results presented in this dissertation include both variables.

proportion of elderly on SSI to have more Medicaid patients. Finally, nursing homes may choose to take on Medicaid patients to achieve economies of scale in production.

The final stated goal of CONs in Florida is to control costs. Thus, it is appropriate to examine the effect of CON policy restrictiveness on nursing home costs. If the state goal of CON policy is being met, one would expect lower costs in areas where CON policy is more restrictive, i.e. in areas where the number of beds per elderly capita is lower.

Medicaid Reimbursement Rate Regulation

A second type of regulatory mechanism facing nursing homes in Florida involves the establishment of reimbursement rates for Medicaid funded nursing home residents. State established Medicaid reimbursement rates in Florida are prospective, meaning that the rates are established in advance for a defined period. During the period, a nursing home is paid at that rate regardless of the costs it actually incurs. Prospective payment systems for Medicaid providers have been implemented in many states in an effort to introduce a degree of constraint on cost increases by setting limits on amounts to be paid during a future period. Prospective payments to skilled nursing facilities differ from prospective payments made to hospitals. Hospitals are paid a fixed rate per admission, not per day, that is based on the patient's diagnoses. In contrast, over the period examined, nursing homes in Florida are paid a fixed rate per patient per day that is not a function of length of stay or diagnoses. For more information regarding the rate-setting process, please see Appendix B.

Changes in Reimbursement Policy

Significant changes in reimbursement methodology that were likely to affect quality, costs, and/or Medicaid resident access to nursing home beds took place during the time period covered by the sample: one change took place on July 1, 1993, two changes took place on July 1, 1995, and three changes took place on July 1, 1996. Given limitations on the number of years for which complete data on nursing home quality and case-mix is available, only an examination of the impact of the 1995 changes is possible while controlling for quality and case-mix. From July 1993 to June 1995, a nursing home could qualify for incentive payments that were based in part upon a facility's Medicaid utilization percentage (MUP).[68] If a facility's Medicaid utilization rate was greater than or equal to ninety percent, the facility would be eligible for all quality and cost based incentives. Facilities with twenty percent or less Medicaid utilization received no incentives. For facilities falling between ninety and twenty percent, the incentives were prorated using the following formula:

$$\text{Prorated Incentives}=\text{Incentives}*\{100*[(\text{MUP}-20\%)/70\%]\} \tag{18}$$

On July 1, 1995, the prorating rules changed. Facilities without more than 65 percent Medicaid utilization after the regulatory change received no incentives. In addition, the prorating formula for operating incentives changed to the following:

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[68] The Medicaid utilization percentage is defined as the total number of Medicaid bed days divided by the total number of bed days for a facility. The terms Medicaid utilization rate and Medicaid utilization percentage are interchangeable.

$$\text{Prorated Incentives}=\text{Incentives}*\{100*[(\text{MUP}-65\%)/25\%]\} \qquad (19)$$

Figure Five provides a graphical depiction of the incentive policies. Prior to the 1995 change, the dollar value of the marginal incentive to accept Medicaid patients was zero for nursing homes with resident populations composed of less than twenty percent Medicaid. In addition, under the old policy, the value of the incentive was increasing in the proportion of Medicaid patients for nursing homes with between twenty and ninety percent Medicaid. After the policy change, marginal incentives remained unchanged for nursing homes where zero to twenty percent of all resident days were Medicaid funded. For nursing homes with twenty to 65 percent Medicaid prior to the policy change, the marginal incentive amount decreased to zero as a result of 1995 policy change. In addition, the incentive for nursing homes with 65 to ninety percent Medicaid decreased, but remained positive. To maintain the same incentive level, nursing homes with twenty to ninety percent Medicaid prior to the change would have to increase the proportion of Medicaid patients in the nursing home. Referring to Figure Five, if a nursing home had a population composed of fifty percent Medicaid prior to the July 1995 change and if it wished to maintain the incentive level, \$A, it would have to increase its Medicaid population to seventy-five percent under the new rules.

The 1995 rate-setting methodology changes also affected the cost reduction incentives provided by the state. In essence, the maximum incentive granted by the state was decreased from fifteen percent of the ceiling established for nursing homes in a given class to ten percent of the ceiling. Furthermore, the potential gain from having operating

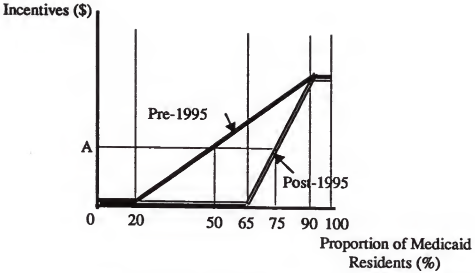

Figure Five: Incentives for Serving Medicaid Patients costs that were less than the class ceiling on operating costs was reduced.[69] The 1995 changes did not affect the distribution of rewards for quality.

A change in incentives related to the proportion of Medicaid residents in a nursing home is likely to affect nursing homes differently. Nursing homes with very low levels of Medicaid residents prior to the change in threshold levels are not likely to try to meet a new 65 percent Medicaid threshold. In particular, one would expect either no change for nursing homes with fewer than twenty percent Medicaid or a decrease in the proportion of Medicaid residents. Nursing homes with low numbers of Medicaid residents before the change may behave like nursing homes with very few Medicaid residents, or they may try to increase their Medicaid populations.

The group most likely to increase their MUPs as a result of the policy change are those with Medicaid populations slightly less than the 65 percent threshold (60%-65% Medicaid). Given that the mean number of beds in a nursing home is 116, a nursing home of average size that was inclined to increase its Medicaid population would have to convert approximately six of its beds from being occupied by some other payer type to being occupied by Medicaid funded residents.[70] If nursing homes wish to maintain the same incentive level, homes with more than 65 percent Medicaid will choose to increase the proportion of Medicaid residents in the nursing home, but the incentive change should not affect homes with very high levels of Medicaid residents, i.e. ninety percent or greater. Thus, a series of five interaction variables are created that capture the effect of the change of regulation on nursing homes with less than twenty percent Medicaid in the previous year (Very Low Medicaid), with between twenty percent and sixty percent Medicaid in the previous year (Low Medicaid), with sixty to 65 percent Medicaid in the previous year (Medium Medicaid), with between 65 percent and ninety percent Medicaid in the previous year (High Medicaid), and with ninety percent or more Medicaid (Very High Medicaid).[71] These variables are included in the right-hand side variables in the proportion Medicaid specification discussed above. For completeness, these variables are also included in the quality specification, although no effect is anticipated given that the decrease in the reward resulting from the 1995 changes in the reward for quality was nominal.

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[69] The factor by which the difference between the operating cost for the class ceiling and the operating cost for the facility was multiplied dropped from .6667 to .64 for facilities with a superior rating and from .3333 to .32 for those with a standard rating.

[70] As the average occupancy rate for Florida nursing homes is 91 percent, some homes will be able to increase the number of Medicaid patients without decreasing the number of patients from other payer categories.

In terms of costs, one would expect an across the board increase in costs to result from reduced incentives to control costs. However, this effect should be seen more strongly for low cost nursing homes given that they are more likely than high cost firms to qualify for cost reduction incentives prior to the change and given that the magnitude of cost reduction incentives is clearly higher for low cost firms. To account for the possibility of a differential effect of the policy change on costs for nursing homes with different pre-change costs, a series of three interaction terms are created that reflect the impact of the regulatory change on nursing homes with lagged costs within one standard deviation from the mean (Medium Cost), with lagged costs that are more than one standard deviation lower than the mean (Low Cost), and with lagged costs that are more than one standard deviation higher than the mean (High Cost).

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[71] Two other sets of cutoffs were also tried for the Low Medicaid and Medium Medicaid groups, changing the Medium Medicaid group to fifty to 65 percent Medicaid prior to the change and 55 to 65 percent

It is also important to note that the hypothesized increased in the proportion of Medicaid residents resulting from the change in policy may have an overall negative effect on costs. Given that Medicaid residents are less costly than other types of residents, as shown in the cross-subsidization essay, an increase in the proportion of Medicaid patients in the nursing home should decrease costs. Thus, the hypothesized effect of the change in cost control incentives is likely to be smaller than it would be in the absence of the change in policy related to the proportion of Medicaid patients in the nursing home.

Estimates of the Impact of CONs and Rate Regulation on Access, Quality, and Costs

Given the hypothesized relationship between the proportion of Medicaid residents in a nursing home and nursing home quality, two-stage least squares is used to estimate the relationship between quality, percent Medicaid, percent Medicare, and case-mix.[72] The following system of equations is estimated using pooled data from all nursing homes in all periods:

$$\begin{aligned}\text{Quality} = {} & \phi_1 + \phi_2\text{Case-Mix} + \phi_3\text{Government Owned} + \phi_4\text{Non-profit} + \phi_5\text{Herfindahl} + \\ & \phi_6\text{Home Health Agencies per Elderly Capita} + \phi_7\text{Labor Force Part. Rate of} \\ & \text{Women} + \phi_8\text{Chain} + \phi_9\text{Beds per Elderly Capita} + \phi_7\text{Urban} + \phi_8\text{Percent} \\ & \text{Medicaid} + \phi_9\text{Percent Medicare} + \phi_{10}\text{Hospital Based} + \phi_{11}\text{Family Group} + \\ & \phi_{12}\text{Residents Group} + \phi_{13}\text{Number of Beds} + \phi_{14}\text{Regulatory Change*No} \\ & \text{Medicaid} + \phi_{15}\text{ Regulatory Change*Low Medicaid} + \phi_{16}\text{ Regulatory} \\ & \text{Change*Medium Medicaid} + \phi_{17}\text{ Regulatory Change*High Medicaid} + \varepsilon_1\end{aligned}$$

Medicaid prior to the change. While the signs of the coefficients do not change, the coefficients on the Medium Medicaid group became insignificant in one specification.

[72] Medicaid or Medicare residents may be more disabled than other payer types, affecting the disability level of the nursing home population as measured by the case-mix index.

Percent Medicaid = α_1 + α_2Quality + α_3Government Owned + α_4 Non-profit + α_5Chain + α_6 Beds per Elderly Capita + α_7Urban + α_8Percent Medicare + α_9Hospital Based + α_{10}Herfindahl + α_{11}Percent of Elderly on SSI in Market + α_{12}Number of Beds + α_{13}Per Capita Income + α_{14} Regulatory Change*No Medicaid + α_{15} Regulatory Change*Low Medicaid + α_{16} Regulatory Change*Medium Medicaid + α_{17} Regulatory Change*High Medicaid + ε_2

Percent Medicare = β_1 + β_2Quality + β_3Government Owned + β_4 Non-profit + β_5Chain + β_6 Beds per Elderly Capita + β_7Urban + β_8Percent Medicaid + β_9Hospital Based + β_{10}Herfindahl + β_{11}Percent of Veterans in Market + β_{12}Number of Beds + β_{13}Proportion of Elderly in Market + ε_3

Case-Mix = δ_1 + δ_2 Percent Medicaid + δ_3Percent Medicare + δ_4Primary Diagnosis 1 + δ_5Primary Diagnosis 2 + δ_6Primary Diagnosis 3 +δ_7Primary Diagnosis 4 + δ_8Primary Diagnosis 5 + δ_9Primary Diagnosis 6 + δ_{10}Primary Diagnosis 7 + δ_{11}Primary Diagnosis 8 + δ_{12}SCU1 + δ_{13}SCU2 + δ_{14}SCU3 + δ_{15}SCU4 + δ_{16}SCU5 + δ_{17}SCU6 + δ_{18}SCU7 + δ_{19}SCU8 + δ_{20}SCU9 + δ_{21}Goverment Owned + δ_{22}Non-profit + δ_{23}Chain + δ_{24}Hospital Based + ε_4.

A lack of data on the quality and case-mix variables for several years leads to many observations being eliminated. Thus, the proportion of Medicaid residents is also estimated using OLS and excluding the quality variable.

The specification outlined above allows one to control for many nursing home specific characteristics. However, to control for all observed and unobserved nursing home specific characteristics that do not vary over time more completely, a one way fixed effects model is used to estimate the following simultaneous equations model using pooled data:

Quality = ϕ_i + ϕ_2Case-Mix + ϕ_5Herfindahl + ϕ_6Home Health Agencies per Elderly Capita + ϕ_9Beds per Elderly Capita + ϕ_8Percent Medicaid + ϕ_9Percent Medicare + ϕ_{11}Family Group + ϕ_{12}Residents Group + ϕ_{13}Number of Beds + ϕ_{14}Regulatory Change*No Medicaid + ϕ_{15} Regulatory Change*Low Medicaid + ϕ_{16} Regulatory Change*Medium Medicaid + ϕ_{17} Regulatory Change*High Medicaid + ε_{1it}

Percent Medicaid = α_i + α_2Quality + α_6 Beds per Elderly Capita + α_8Percent Medicare + α_{10}Herfindahl + α_{11}Percent of Elderly on SSI in Market + α_{12}Number of Beds + α_{13}Per Capita Income + α_{14} Regulatory Change*No Medicaid + α_{15} Regulatory Change*Low Medicaid + α_{16} Regulatory Change*Medium Medicaid + α_{17} Regulatory Change*High Medicaid + ε_{2it}

Percent Medicare = β_i + β_2Quality + β_6 Beds per Elderly Capita + β_8Percent Medicaid + β_{10}Herfindahl + β_{12}Number of Beds + β_{13}Proportion of Elderly in Market+ ε_{3it}

Case-Mix = δ_i + δ_2 Percent Medicaid + δ_3Percent Medicare + δ_4Primary Diagnosis 1 + δ_5Primary Diagnosis 2 + δ_6Primary Diagnosis 3 +δ_7Primary Diagnosis 4 + δ_8Primary Diagnosis 5 + δ_9Primary Diagnosis 6 + δ_{10}Primary Diagnosis 7 + δ_{11}Primary Diagnosis 8+ ε_{4it}.

where i=1,...,N, where N is the number of nursing homes and t=1,...,T, where T is the number of observations of nursing home i. Thus, the fixed effects model provides estimates of a nursing home specific intercept term for each nursing home in the sample.[73] Note that several of the nursing home characteristics that are very likely to remain constant across several observations of a single nursing home have been eliminated. Included among these variables are the following: ownership type, whether the nursing home is part of a chain, whether the nursing home is located in an urban area, the presence of a specific type of special care unit in the home, and whether the nursing home is hospital based. Moreover, data on the labor force participation rate of women in the market and on the percentage of elderly who are veterans is only available for 1990, necessitating the removal of these factors from the fixed effects specification.

Turning to the cost function estimates, as in Chapter Two, the total costs of an individual nursing home are a function of outputs (measured by resident days), of relative input prices, and of a vector of control variables. The model contains three outputs: Medicaid patient days, Medicare patients days, and private-pay patient days, where private-pay patient days include days funded by "other" means. The model contains four input prices, one for each of the following inputs: labor (including nursing services), property, and patient care services (less nursing services). In addition to input prices and output variables, control variables are added to the cost function specification. For a description of the variables involved, see Table Thirteen. Note that total costs are deflated to 1986 dollars using the Consumer Price Index.

The system of equations, as outlined in Chapter Two, is estimated through the method of nonlinear seemingly unrelated regression, where all observations from all nursing homes for which complete data is available are included. To control for unobserved nursing home specific characteristics that remain unchanged over time, the cost function is also estimated after including a dummy variable for (N-1) of the nursing homes and removing the variables that are indicators of nursing home specific characteristics that are likely to remain fixed over time.

Empirical Results

Tables Fourteen and Fifteen contain estimates of the impact of CON restrictiveness and rate-setting regulatory change on the proportion of Medicaid residents

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[73] Given that there are over 600 nursing homes in the sample, these nursing home specific coefficient estimates are not included in the reported estimates.

Table Thirteen: Cost Function Variables

Costs: ln C-The logarithm of total nursing home costs per year.
Outputs:
Private-The annual number of Private-pay and other resident patient days (X1).
Medicaid-The annual number of Medicaid resident patient days (X2).
Medicare-The annual number of Medicare resident patient days (X3).
Input Prices:
W1-The annual price index for hospital wages by MSA, a proxy for relative nursing home wages.
W2-The annual price index by county for housing.
W3-The annual composite price index by county.
Fixed Input:
Capital-The number of beds in the nursing home.
Control Variables:
Percent 65+-The proportion of the population in the county over age 65.
Case-mix-The Katz index of activities of daily living or the Thoms index, a case-mix indices of health status.
Herfindahl-The Herfindahl index, a measure of market concentration, based on resident days for all nursing homes within the county.
Non-profit-Binary variable equal to one if the nursing home is non-profit.
Government-Binary variable equal to one if the nursing home is government owned.
Chain-Binary variable indicated whether the nursing home is part of a chain of nursing homes.
Hospital Based-Binary variable indicating whether the nursing home is hospital based.
Beds per elderly-The number of beds per person age 65+ in the county, a measure of the restrictiveness of the market for nursing home beds, resulting from the Certificate-of-Need process.
Quality-The number of deficiencies per patient day, the number of registered nurse hours per patient day, and/or the number of total nurse hours per patient day.
Urban-Binary variable indicating whether the nursing home is in an MSA.
Regulatory Change*Low Cost-An interaction term representing the effect of the regulatory change on nursing homes with costs that are lower than one standard deviation away from the mean cost.
Regulatory Change*Medium Cost-An interaction term representing the effect of the regulatory change on nursing homes with costs that within one standard deviation from the mean cost.
Regulatory Change*High Cost-An interaction term representing the effect of the regulatory change on nursing homes with costs that are higher than one standard deviation away from the mean cost.

in the nursing home. Tables Sixteen and Seventeen include estimates of the effect of CON policy and rate-setting regulatory changes on nursing home quality and on nursing home costs, respectively.[74] Beginning with Tables Fourteen and Fifteen, the level of restrictiveness of the CON program in a market only has an effect in the pooled OLS specification without fixed effects contained in Table Fifteen, where the effect of CON restrictiveness is positive. In other words, allowing for more beds per elderly capita in a market increases the proportion of Medicaid residents in nursing homes. As the empirical results in Table Sixteen show, it appears that CON regulation has no significant effect on quality. This is not suprising given that CON policy regarding quality only involves elimination of the worst nursing homes and chains that have been identified by regulators. Table Seventeen contains the cost function estimates. While CON programs have long been justified as a means to control costs, the degree of CON restrictiveness does not appear to have any effect on nursing home costs.

In Table Sixteen, three sets of fixed effects estimates of the proportion of Medicaid residents in the nursing home are presented. Column one includes 2SLS fixed effects estimates using inspection violations as the quality variable. Similarly, column two presents 2SLS fixed effects estimates where RNs per patient day is the quality variable. Hausman tests for endogeneity of the quality variable reveal that OLS is consistent and efficient when RNs are used as the quality measure, but the null is rejected at the 90 percent level in the case where deficiencies are the quality measure, implying

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[74] The fits for the specifications using deficiencies per patient as an endogenous variable were very poor. Thus, Table Fifteen only presents the quality results from using RNs per patient as a proxy for quality.

Table Fourteen: Effect of Regulation on Proportion of Medicaid Residents (Fixed Effects)

Variable	2SLS Fixed Effects	2SLS Fixed Effects	OLS Fixed Effects
Quality (Deficiencies)	0.03473		
	(0.03)		
Quality (RNs per patient day)		0.26490	
		(0.79)	
Beds per elderly (CON regulation)	-0.64715	-0.20918	0.22875
	(0.36)	(0.39)	(1.12)
Percent Medicare	-0.92234 *	-0.88741 *	-0.64819 *
	(4.60)	(7.43)	(20.64)
Herfindahl	-0.18038	-0.23601	-0.12845 *
	(0.29)	(0.41)	(2.25)
Per Capita Income (in 0000's)	-0.00509	-0.01061	0.09885 *
	(0.05)	(0.34)	(14.80)
Number of beds	-0.00005	-0.00007	0.00001
	(0.31)	(0.90)	(0.33)
Percent on SSI	1.10876	1.08613	0.76190 *
	(0.55)	(1.33)	(8.84)
Reg. Change x Very Low Medicaid	0.02885	0.03452	0.03413 *
	(0.44)	(1.08)	(2.0)
Reg. Change x Low Medicaid	0.03906	0.03058 *	0.02136 *
	(1.57)	(2.47)	(3.96)
Reg. Change x Medium Medicaid	0.02943	0.02406	0.01221
	(0.86)	(1.39)	(1.34)
Reg. Change x High Medicaid	0.00754	0.00100	-0.00681
	(0.39)	(0.11)	(1.53)
Reg. Change x Very High Medicaid	0.01128	-0.00117	-0.02860 *
	(0.19)	(0.04)	(2.35)
Number of observations	1346	1122	3965
R-squared	0.68	0.95	0.91

Note: * indicates significance at, at least, the 5% level.

Table Fifteen: Effect of Regulation on Proportion of Medicaid Residents (Pooled with No Fixed Effects)

	2SLS	2SLS	OLS
Variable	**No Fixed Effects**	**No Fixed Effects**	**No Fixed Effects**
Quality (Deficiencies)	0.90121 *		
	(4.28)		
Quality (RNs per patient day)		0.37455	
		(1.35)	
Beds per elderly (CON regulation)	0.22201	-0.02014	0.52413 *
	(0.84)	(0.08)	(3.71)
Percent Medicare	-1.27861 *	-1.20931 *	-0.80474 *
	(9.56)	(5.52)	(22.92)
Herfindahl	0.11249 *	0.12692 *	0.15752 *
	(2.49)	(2.91)	(6.88)
Per Capita Income (in 0000's)	-0.04582 *	-0.04719 *	-0.04128 *
	(4.76)	(5.13)	(7.17)
Number of beds	-0.00007	-0.00004	0.00003
	(0.63)	(0.39)	(0.52)
Percent on SSI	0.05889	0.09380	0.45616 *
	(0.77)	(1.11)	(9.74)
Reg. Change x Very Low Medicaid	-0.23561 *	-0.23998 *	-0.17028 *
	(6.01)	(6.50)	(6.26)
Reg. Change x Low Medicaid	-0.07684 *	-0.08420 *	-0.06851 *
	(5.32)	(5.96)	(6.52)
Reg. Change x Medium Medicaid	0.04775 *	0.03825	0.05758 *
	(2.27)	(1.92)	(3.08)
Reg. Change x High Medicaid	0.09383 *	0.10128 *	0.12941 *
	(8.11)	(9.41)	(15.80)
Reg. Change x Very High Medicaid	0.21053 *	0.23309 *	0.21469 *
	(7.0)	(8.18)	(10.44)
Constant	0.75871 *	0.79255 *	0.70296 *
	(17.74)	(20.22)	(31.11)
Government Owned	0.01306	-0.00945	0.09657 *
	(0.36)	(0.23)	(4.78)
Non-Profit	0.02746	0.01221	0.01566
	(1.82)	(0.89)	(1.91)
Chain Owned	0.04909 *	0.04854 *	0.03196 *
	(3.83)	(3.62)	(4.65)
Urban	-0.00127	0.00092	-0.00514
	(0.06)	(0.05)	(0.40)
Hospital Based	0.37281 *	0.31818 *	0.07169 *
	(6.12)	(5.50)	(2.94)
Number of observations	1103	1114	4230
R-squared	0.59	0.64	0.41

Note: * indicates significance at, at least, the 5% level.

Table Sixteen: Effect of Regulation on Quality (RNs Per Patient)

	2SLS		2SLS	
Variable	No Fixed Effects	Fixed Effects	No Fixed Effects	Fixed Effects
Case-mix (Thoms)	0.00011	0.00399		
	(0.17)	(0.92)		
Case-mix (Katz)			0.00002	0.00463
			(0.0)	(0.01)
Herfindahl	-0.03722 *	0.10569	-0.03650 *	0.57469
	(1.96)	(0.11)	(1.96)	(0.17)
Beds/elderly (CON restictiveness)	-0.06105	0.02746	-0.07784	0.33926
	(0.36)	(0.02)	(0.42)	(0.06)
Percent Medicaid	0.03029	0.05908	0.02912	0.05908
	(0.49)	(0.43)	(0.45)	(0.10)
Percent Medicare	0.63586 *	0.24840	0.63501 *	0.24840
	(3.70)	(1.07)	(3.63)	(0.25)
Family Group	-0.01471 *	-0.00628	-0.01438 *	-0.00195
	(2.24)	(0.33)	(2.25)	(0.03)
Resident Group	-0.03154	0.12352	-0.03125	0.00729
	(0.49)	(0.78)	(0.48)	(0.02)
Home Health Agencies	-3.29784	-2905.50	-3.32903	-1736.67
	(1.22)	(0.38)	(1.19)	(0.05)
Number of beds	0.00002	0.00005	0.00002	0.00004
	(0.24)	(0.37)	(0.25)	(0.06)
Reg. Change x Very Low Medicaid	0.00947	0.00623	0.00957	-0.01662
	(0.22)	(0.10)	(0.23)	(0.07)
Reg. Change x Low Medicaid	-0.01268	-0.00389	-0.01231	-0.00842
	(0.76)	(0.12)	(0.78)	(0.05)
Reg. Change x Medium Medicaid	-0.01453	0.00641	-0.01478	-0.00035
	(1.51)	(0.18)	(1.26)	(0.0)
Reg. Change x High Medicaid	0.00031	0.00182	0.00034	0.00475
	(0.04)	(0.13)	(0.03)	(0.06)
Reg. Change x Very High Medicaid	0.01698	0.04358	0.01620	0.01501
	(0.94)	(0.78)	(0.62)	(0.07)
Labor Force Part. Rate of Women	0.00089		0.00091 *	
	(1.78)		(2.11)	
Chain Owned	-0.02224 *		-0.02223 *	
	(2.55)		(2.53)	
Urban	-0.01061		-0.01034	
	(1.11)		(1.03)	
Hospital Based	-0.05983		-0.05886	
	(0.86)		(0.83)	
Constant	-0.00502		0.01020	
	(0.05)		(0.07)	
Government Owned	0.07998 *		0.08013 *	
	(3.09)		(3.09)	
Non-Profit	-0.00726		-0.00772	
	(0.94)		(1.05)	
Number of observations	1114	1122	1114	1122
R-squared	0.40	0.62	0.40	-6.60

Note: * indicates significance at, at least, the 5% level.

Table Seventeen: Effect of Regulation on Costs

Variable	Thoms Case-mix & Deficiencies		Katz Case-mix & Deficiencies		Thoms Case-mix & RNs per patient		Katz Case-mix & RNs per patient	
	No Fixed Effects	Fixed Effects	No Fixed Effects	Fixed Effects	No Fixed Effects	Fixed Effects	No Fixed Effects	Fixed Effects
Beds/elderly (CON restictiveness)	-0.25538	-0.03162	-0.30598	-0.00526	0.00710	0.00029	0.00396	0.00026
	(1.05)	(0.08)	(1.26)	(0.01)	(0.57)	(0.31)	(0.32)	(0.28)
Regulatory Change x Low Cost	0.02757	0.07899 *	0.02407	0.07634 *	0.02471	0.06797 *	0.01858	0.06514 *
	(1.07)	(3.87)	(0.93)	(3.76)	(0.85)	(3.04)	(0.64)	(2.91)
Regulatory Change x Medium Cost	0.04682 *	0.05073 *	0.04509 *	0.04626 *	0.04690 *	0.04890 *	0.04500 *	0.04698 *
	(4.06)	(7.17)	(3.86)	(6.41)	(3.71)	(6.39)	(3.52)	(6.06)
Regulatory Change x High Cost	0.14479 *	0.04780 *	0.14307 *	0.04159 *	0.14176 *	0.03383 *	0.13992 *	0.03096 *
	(7.97)	(3.98)	(7.81)	(3.43)	(6.61)	(2.50)	(6.48)	(2.27)
Number of observations	1436	1436	1436	1436	1206	1206	1206	1206

Note: * indicates significance at, at least, the 5% level. Variables not shown include the following: outputs, input prices, cross-product terms, quality, case-mix, Herfindahl, and nursing home size.

that 2SLS should be used.[75] Data on inspection violations and RNs is limited to three years (1994, 1995, and 1996) for most nursing homes. Thus, the sample size may be increased significantly by eliminating the quality measure from the specification. This allows for OLS fixed effects estimates, shown in column three of Table Sixteen, of the proportion Medicaid but contributes a degree of omitted variable bias.

To test for the inclusion of group effects variables, which are added in fixed effects estimation, an F-Test is conducted. The test statistic leads to the rejection of the null hypothesis that firm effects are the same across nursing homes, leading to the conclusion that the fixed effects estimates are preferred to the estimates without group effects. Thus, the fixed effects estimates in Table Sixteen of the impact of the regulatory change on the proportion of Medicaid residents in a nursing home shall be considered first.

The effect of the change in rate-setting policy on July 1, 1995, on the proportion of Medicaid residents is significant and positive for nursing homes with more than twenty but less than sixty percent Medicaid in the previous period in two of the three specifications, where these nursing homes increased the proportion of Medicaid residents in the nursing home by approximately two to three percentage points. In the OLS estimates in column three, the coefficient on the regulatory change for homes with the largest proportion of Medicaid residents is negative and significant, while the coefficient on the change variable for homes with the smallest proportion of Medicaid residents is positive and significant. Thus, nursing homes significantly below the incentive cutoff increased the level of Medicaid residents in the nursing home while those with the most Medicaid residents appeared to decrease the level of Medicaid residents in the home. However, the group with 60-65 percent Medicaid prior to the change, while small, did not significantly change its behavior in response to the regulatory change.

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[75] The value of the test statistic is 24.888 for the specification where quality is measured in deficiencies,

Estimates of the proportion of Medicaid residents in a nursing home were also conducted using a pooled sample of nursing homes observed over time without fixed effects. The estimates are contained in Table Fifteen. The results of these estimates contradict the findings from the fixed effects model, where the regulatory change appears to cause nursing homes with low levels of Medicaid residents to reduce the number of Medicaid residents in their homes and to cause nursing homes with high levels of Medicaid residents to accept more Medicaid residents after the change. Apparently, variables indicating nursing home characteristics in the pooled estimates without fixed effects failed to control adequately for all facility specific differences that remain constant over time and that determine the reaction of some nursing homes to the change in regulatory policy.

As expected, Table Sixteen shows that the policy change in the proportion of Medicaid resident threshold for incentives had no significant effect on nursing home quality. However, most of the explanatory power in the fixed effects quality estimates comes from the group dummies, i.e. nursing home specific characteristics. In contrast, the results contained in Table Seventeen show that the policy change had a positive and significant effect on nursing home costs. Examining the fixed effects results in all four

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and the test statistic is 11.349 for the specification in which quality is measured in RNs.

specifications, it is clear that inflation adjusted costs for low cost firms increased more after the change than they did for medium or high cost firms. As anticipated, reductions in the payoff for being low cost firm led to increased costs.

Conclusions

Nursing homes in Florida are subject to both capacity and price regulation in the forms of Certificate-of-Need regulation and Medicaid reimbursement rate-setting regulation, respectively. The stated goals of the CON program are as follows: cost containment of overall health care expenditures, ensuring a minimum level of quality of health care, and ensuring access to health care goods and services. It appears that *less* restrictive CON policy may have a positive impact on the proportion of Medicaid residents, that CON policy has no apparent effect on quality, and that CON policy has no effect on costs. However, these results should be considered in light of the limited number of observations that are used when the quality and case-mix measures are included. In addition, the measure of CON restrictiveness, the number of beds per elderly capita in the market, used exclusively captures within state variations in CON policy. Not considered are the costs of implementing the CON program and aspects of the statewide program that remain fixed over time.

Recall from the literature review, that several other authors have explored the effect of CON regulation on nursing homes. While Nyman (1985, 1988a, 1988b), in his series of investigations of excess demand in Wisconsin's nursing home industry, does not implicate CON policies explicitly in the creation of excess demand, Gertler (1985) and

Gulley and Santerre (1997) do include measures of CON policy in their empirical estimates. In their paper, Gulley and Santerre use the number of years that a state has had a CON program in place as a measure of the program's effect on nursing home service provision. However, there may be an endogeneity problem associated with including such a policy measure given that states with low levels of nursing home services resulting from the relative unprofitability of nursing home service provision in the state may not develop a program to control the bed supply. In addition, this variable does not allow for differences in the degree of CON restrictiveness across states and does not allow for differences across markets within states.

In his paper, Gertler finds that the CON program has a negative effect on quality where the measure of the effectiveness of the CON program is the HHI. In the pooled quality estimates, contained in Table Sixteen, the level of market concentration in the county is found to have a negative effect on quality in the nursing home. In addition, the fixed effects estimates contained in Table Fourteen reveal that nursing homes in more concentrated areas have a smaller proportion of Medicaid residents. Thus, if one considers the HHI to be the appropriate measure of the effectiveness of the CON program, my results are consistent with the findings of Gertler.

However, the problem with using only the HHI as a measure of CON policy is that it is constructed using the squared market shares for each firm in the industry. While CON policy may affect the number of firms in the industry and the distribution of the bed supply among firms, a casual examination of the CON application data reveals that the CON in Florida has been very active in regulating the total number of bed additions in a market. If firms are awarded bed additions (or denied such additions) in a uniform manner, the market shares of the firms may not change when CON policy becomes more or less restrictive. Thus, the number of beds per elderly capita, which is used in my analysis, more closely reflects differences in CON restrictiveness policy over time and across counties.

Turning to the Medicaid reimbursement rate-setting, price regulation may be used by regulators to provide incentives to reduce costs, increase access for Medicaid funded patients, and increase quality. The July 1, 1995, policy change did two key things: it increased the proportion of Medicaid residents that a nursing home must have to be eligible for certain incentives, and it decreased the rewards to being a low cost operator. As expected, nursing homes responded by raising costs, with low cost nursing homes increasing costs more rapidly than medium and high cost nursing homes. Furthermore, there is evidence that nursing homes with significantly less than the threshold level of Medicaid residents prior to the change increased their proportion of Medicaid residents, while nursing homes above the threshold decreased their Medicaid populations.

In conclusion, regulators of Florida's nursing home industry have conflicting effects on the dimensions of nursing home care considered in this essay: the proportion of Medicaid residents in the nursing home, nursing home quality, and nursing home costs. While CON laws may reduce the proportion of Medicaid residents in nursing homes, the reimbursement rate-setting methodology serves to increase the proportion of Medicaid residents in some nursing homes and to decrease the proportion of Medicaid residents in other nursing homes. In terms of cost, the price regulation mechanism does affect costs in the hypothesized manner, but CON policy, which has been touted as a means to control costs, had not apparent effect on costs. Thus, "expenditure control by the state," not cost control at the nursing home level, is likely to be a driving force behind the CON regulation. Finally, neither mechanisms appear to have much affect on quality at the margin.

CONCLUSION

The empirical investigation of economic regulation in the nursing home industry began with a discussion of key aspects of the nursing home literature. Starting with a brief history of the nursing home industry and a description of the manner in which nursing home care is funded, background for the discussion of the pressing issue of access to nursing home care for Medicaid patients is provided. While many previous authors have found evidence of excess demand in the nursing home industry, there has been relatively little empirical analysis of the causes of excess demand. Those that have addressed the issue have focused on CON regulation and have presented mixed evidence regarding the impact of CON legislation on excess demand. Besides the issue of access for Medicaid patients, other authors involved in health research or nursing home studies have focused on the following key aspects of the nursing home industry: the appropriate nursing home market definition, substitutes for nursing home care, nursing home quality, and nursing home costs. Literature is considered from each of these areas in turn.

Following the literature review, a model of nursing home behavior is developed. Unlike previous models, which only consider Medicaid and private-pay patients, the model presented in this dissertation adds a third group of customers, Medicare funded patients. The expanded model is empirically relevant since Medicare patients constituted almost twenty percent of Florida's nursing home population in 1996 and provided nearly

36 percent of total revenue. Further, by explicitly including Medicare patients one is able to consider the effects of regulatory changes on the mix of patient types. After reviewing the literature and presenting the model, the degree of cross-subsidization in nursing homes given Medicaid reimbursement rates is considered.

Through an examination of alternative explanations for the empirical observation that private-pay rates are often greater than Medicaid reimbursement rates, the hypothesis of cost shifting in nursing homes between payer types is tested. Using a generalized translog cost function and standard tests from the industrial organization literature for cross-subsidy, cross-subsidization is determined to be taking place in approximately one-quarter to one-third of Florida's nursing homes. Thus, the empirical evidence supports the assertion by nursing home owners that the Medicaid program does not reimburse some nursing homes enough to cover the costs of providing quality care to Medicaid funded patients. However, cross-subsidization is clearly not taking place in every nursing home.

Through consideration of alternative explanations for the rate differential, Medicaid residents are found to be clustered in low cost and low quality homes, are found to be less costly, and may be receiving a lower level of quality than other payer types within a given nursing home. The estimated marginal cost of a Medicaid resident day in a nursing home with average characteristics is determined to be $28.37, which is lower than the estimated marginal cost of care for other resident types. Moreover, nursing homes with a high proportion of Medicaid residents have relatively low costs per resident day. Turning to the issue of quality, probit estimates that control for resident and facility characteristics reveal that Medicaid funded residents have a higher probability of death in nursing homes. However, this result is tentative given that information about the nursing home residents in the data set used is rather sparse. In turn, at the facility level, the proportion of Medicaid patients in the nursing home is found to negatively impact quality.

The finding of cross-subsidization in Florida nursing homes is of particular relevance given recent changes in the Medicare program. The shift to prospective payment for Medicare funded care will inevitably decrease the payment rates for Medicare residents. Nursing homes, who have been shown to cross-subsidize under less financially restrictive conditions, may increase cross-subsidization or decrease quality levels. Both of the aforementioned potential implications have been the focus of public concern in recent years, and the study findings reveal that nursing homes are already engaged, to some degree, in these activities.

The shift of the Medicare program from cost-based to prospective payment for nursing home care may not bode well for Medicare funded nursing home residents if the federal government moves too far in the direction of restricting reimbursement rates. This study reveals that restricting government established reimbursement rates to a level below the market determined self-pay rate results in clustering of government funded (Medicaid) residents in low cost, low quality nursing homes. In addition, the burden of payment for Medicaid patients in nursing homes where the state underpays clearly falls on the shoulders of self-pay residents, as nursing homes are permitted under state imposed restrictions on bed additions to raise the self-pay price without risking flight of self-pay residents to competing nursing homes. Thus, this study provides a pre-Medicare change snapshot of the negative effects of low Medicaid reimbursement rates when coupled with a vigorous CON program using a unique combination of nursing home facility and resident data from several recent years.

In the second empirical essay, the impact of regulatory measures on nursing home quality, nursing home costs, and the proportion of Medicaid residents in the nursing home is examined. When controlling for facility specific characteristics, the certificate-of-need (CON) program is found to have a negative impact on the proportion of Medicaid residents in a nursing home, CON policy is found to have no effect on quality, and CON policy is found to have no effect on costs. Thus, this essay adds to the literature on health regulation and provides evidence that the CON program in Florida has not met its three stated policy goals with respect to nursing homes: cost containment of overall health care expenditures, ensuring a minimum level of quality of health care, and ensuring access to health care goods and services. Instead, the program is apparently being used primarily as a less politically controversial method of controlling the total level of Medicaid funded nursing home care in the state. Many states have eliminated CON regulation of nursing homes. Given the costs of the CON program, given the lack of effectiveness of CON policy in controlling costs and quality, and given the negative effects of CON on access for Medicaid residents, Florida policy makers should consider following the lead of other states.

In the final empirical essay, changes in Medicaid reimbursement rate-setting methodology are also considered. Providing evidence that nursing home operators respond in a manner that is consistent with economic theory, nursing home owners are found to respond to incentives to increase the proportion of Medicaid residents in the nursing home. Moreover, the same owners respond to decreases in cost control incentives by increasing costs. Thus, price regulation through Medicaid reimbursement rate-setting may be a more effective, although less politically favorable, way to reach the above CON program stated policy goals.

As nursing home owners are clearly sensitive to changes in the Medicaid reimbursement rate-setting methodology, one partial remedy for the cross-subsidization problem is an increase in the Medicaid reimbursement rate. While such a change will, if large enough, increase access to care for Medicaid funded patients and reduce the efficiency losses associated with the tax on self-pay patients in homes that cross-subsidize, increasing reimbursement rates will not solve the general problem of a restricted bed nursing home bed supply. However, both increasing the Medicaid reimbursement and eliminating the CON program would inevitably increase Florida's expenditures on long-term care through the Medicaid program. Under such circumstances, policy-makers wishing to control expenditures will be forced to place tighter restrictions on Medicaid eligibility, a factor that decreases the probability that such programmatic changes will be adopted in Florida in the near future.

In summary, this dissertation examines the impact of regulatory measures and market forces on nursing homes and their residents. Using a unique combination of nursing home facility and resident level data sets, the dissertation adds to the literature on nursing home costs, nursing home quality, access for Medicaid residents in nursing homes, and cross-subsidization in health care provision. In a broader sense, the dissertation contributes to the literature on health regulation and on regulation in monopolistically competitive industries. Given that the federal government is tightening its belt through changes in Medicare's payment for nursing home care and given ongoing concerns about the quality of nursing home care, this study provides a pre-change picture of cost shifting within nursing homes. While further examination of the impact of the Medicare change on the industry is left for future researchers, the empirical study in this dissertation may serve as a starting point for research on cost shifting and quality changes resulting from the Medicare program change. The dissertation also provides support for anecdotal evidence of relatively poor quality care for Medicaid patients and of cost-shifting among payer types in the nursing home. In addition, this study present evidence regarding the impact of price regulation and certificate-of-need regulation on nursing home costs, nursing home quality, and access for Medicaid patients.

APPENDIX A: DATA

Data on individual nursing home residents is collected by the Florida Agency for Health Care Administration (AHCA). Within the first fourteen days of a resident's admission to a nursing home, the nursing home is required to conduct a full assessment of the resident and develop a care plan for the resident.[76] A full assessment is done during each year and a partial assessment is done quarterly. Data is also collected upon discharge. The Health Care Financing Administration (HCFA) requires that all assessments are kept by the facility, but only a portion of the data is transmitted to AHCA. A nonconfidential version of the assessment data was procured that includes residents discharged by year for 1987-1997.[77] Included among the information provided for each resident are the following: facility, primary diagnosis at admission as recorded on the preliminary resident assessment and care plan, principal payer at admission, whether individual eventually converts to Medicaid, where patient came from immediately prior to admission, reason for discharge, age, and number of days spent in nursing home prior to Medicaid conversion.

The second group of data that was obtained from AHCA contains reimbursement oriented facility level variables for 1986-1997. Included in the data set are provider identifiers and categorization variables such as district and an urban/rural designation. Moreover, the following facility specific information is contained in the series: ownership type, the facility specific Medicaid reimbursement rate for each rate-setting semester, the number of beds in the rate semester, a history of provider numbers, and whether the facility is part of a chain.

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[76] Chapter 10-29 109 (b) FAC.

[77] Due to confidentiality concerns, the data set does not include an individual identifier. Thus, it is impossible to track residents from nursing home to nursing home. Each individual becomes a new observation when entering a new nursing home.

Annual skilled nursing facility financial data were also obtained from AHCA for 1986-1996. The series includes information from all providers on revenues by payer type, costs by subcategory, payer-mix in the nursing home, and ownership information. Revenues include revenues from each payer category: private, Medicaid, Medicare, Insurance/HMO, and VA. Data for each payer type is presented for each of the following categories: routine services, physical therapy, speech therapy, occupational therapy, audiological therapy, medical supplies, pharmacy, lab, radiology, and other ancillary revenues. The financial data also contains the number of patient days during the fiscal year for the following resident types: private, VA, Medicare, Medicaid, Insurance/HMO, and Other.

Totals are provided for five cost categories: administration and overhead, ancillary cost centers, patient care costs, property costs, and other cost centers. Each of the aforementioned categories is broken down further. Administration and overhead includes plant operation, housekeeping, administration, and owner's administrative compensation. The ancillary cost centers category encompasses costs for physical therapy, speech therapy, occupational therapy, medical supplies charged to patients, radiology, lab, pharmacy, and other ancillary costs. Patient care costs include nursing costs, dietary costs, and other patient care costs. Finally, the category "other costs" breaks down into laundry/linens, outpatient clinic, and other. In addition to the above information required of all providers, Medicaid providers are obligated to submit data on daily private patient rates at the beginning of the period, private rate changes during the year, and home office charges.[78]

Turning to the nursing home inspection data sets managed by the Health Care Financing Administration (HCFA), the Provider of Services (POS) file contains data regarding provider certification, facility and service characteristics, provider type, and location. In the past, the inspection data for all Medicare and Medicaid providers was sent to the HCFA regional offices by the state agency charged with the task of inspecting the homes. Each provider's data elements were sorted and assembled into a transaction record. Error free transactions were added to a master file and were available through the Medicare/Medicaid Automated Certification System (MMACS) and the Rapid Data Retrieval System (RADARS). In March 1990, the MMACS was discontinued, and it was replaced by the Online Survey Certification and Reporting (OSCAR) System in October 1991. Presently, state agencies survey facilities and key survey information into the OSCAR system, where the data elements are edited online during data entry. The POS file is created by extracting select data from OSCAR quarterly. POS data from 1989-1997 was obtained.

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[78] Daily private rates are provided for private rooms, semi-private rooms, and rooms with three or more beds. Up to four changes per year are reported.

The POS data contains information on staffing, number of beds by payer type, and services provided. To obtain the staffing information, the surveyor is instructed to specify the full-time equivalents (FTEs) providing the services. FTEs are calculated using a 35 hour week and are based upon the staff hours worked in the fourteen days prior to the survey. Information is collected about a variety of worker types including, but not limited to, registered nurse (RN) directors of nurses, nurses with administrative duties, registered nurses, licensed practical or licensed vocational nurses, certified nurse aides, and nurse aides in training. For each category, total FTEs are computed for full-time (35 or more hours), part-time (less than 35 hours), and contract employees.

Information concerning services provided is also collected during the inspection process. For example, the presence of an organized group of residents and/or an organized group of family members of residents is recorded. Surveyors also note the number of beds identified and dedicated by the facility for residents with specific needs or diagnoses. The number of beds is noted for each of the following types of dedicated special care units: A.I.D.S., Disabled Children/Young Adults, Huntington's Disease, Alzheimer's Disease, Head Trauma, Ventilator/Respiratory Care, Dialysis, Hospice, and Other Specialized Rehabilitation.

The POS file does not include all of the information gathered during the inspection process. In particular, the file omits the following: data on deficiencies, a complete resident census, and data on conditions of residents. Data on deficiencies, i.e. inspection violations, is kept by HCFA from the implementation date of the OSCAR system, October 1991, and data from 1991-1997 was obtained. However, due to an administrative decision at HCFA, only the current and previous three surveys containing resident census and the conditions of residents are kept by the agency in electronic form. Therefore, resident census data, which is used to form the case-mix variables, is only available for the most recent four inspection reports.

Included among the resident census variables is the number of residents in each of three assistance levels for each of five Activities of Daily Living (ADLs). The assistance levels are independent, requiring the assistance of one or two staff, and dependent. The ADLs considered are bathing, dressing, transferring, toilet use, and eating. Data are also collected on bowel and bladder status.[79]

Brad Hobbs (1991) has made available the inspection data used in his dissertation. This data covers approximately one year, and it contains elements from the MMACS and RADARS. While more limited than the inspection data from the OSCAR system and POS file, to a large degree, the data elements coincide.

Along with the data from HCFA, AHCA, and Brad Hobbs, demographic and price-oriented data are used in the analysis. From HCFA, I obtained the Hospital Wage Index public use file. The portion of the file that I utilize contains hospital wage indices by MSA from 1986 through 1997. From the Florida Statistical Abstracts from 1986-1997, I acquired data on population of individuals over age 65 by county, per capita personal income by county, the Florida Price Level Index by county, the Florida Housing Price Level Index by county, and the number of elderly receiving supplemental security income by county. Data on home health agencies was taken from the Florida Health Care Atlas, while labor force participation rates for women by county were taken from the County and City Data Book. Finally, data on the number of veterans by county was obtained from the U.S. Census STF3A file.

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[79] Data on bowel and bladder status includes the number of residents with catheters, bladder incontinence, and bowel incontinence.

APPENDIX B: INTRODUCTION TO MEDICAID RATE-SETTING PROCESS 1986-1997[80]

Medicaid reimbursement rates in Florida are set prospectively. The term 'prospective' refers to a method of paying nursing homes a rate of payment that is established in advance for a defined period. A nursing home will be paid at that rate regardless of the costs it actually incurs. Prospective payment systems for Medicaid providers have been implemented in many states in an effort to introduce a degree of constraint on cost increases by setting limits on amounts paid during a future period. Prospective payments to nursing homes differ from prospective payments made to hospitals. Hospitals are paid a fixed rate per admission, not per day, that is based on the patient's diagnosis. In contrast, nursing homes are paid a fixed rate per patient per day that is not a function of length of stay or diagnosis.

In Florida, a nursing home's prospective rate is based on a cost report from six to eighteen months prior to the period for which the rate is being set.[81] Cost reports must be submitted by a skilled nursing facility within three months from the close of the annual reporting period.[82] A field audit or desk audit may be conducted at random or if there is reason to believe that the provider is claiming or has claimed reimbursement for unallowable costs. Rates are subject to ceilings and are set for six-month periods in January and July of each year.

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[80] Florida Agency for Health Care Administration, Florida Title XIX Long-Term Care Reimbursement Plan: Version XIV, (November 6, 1997), pp. 1-74.

[81] Prior to July 1, 1991, the agency used cost reports from up to twenty-four months prior to the period for which the rates are being set. It is not clear that the potentially shorter period between cost report submission and use benefits nursing homes given that the components of the rate are adjusted for inflation.

[82] If reports are more than six months late, the Medicaid provider agreement is cancelled.

A single rate per patient per day is paid to each facility. The total cost-related per diem for each facility is based upon the following categories: property costs, return on equity, operating costs, patient care costs, and incentive payments. For the first half of 1997, the statewide average Medicaid reimbursement rate was $93.16. The highest rate paid to any facility during this period was $141.76, and the lowest rate paid to any facility was $66.83. In contrast, in 1996, the average reported daily rate paid by private-pay residents was $138.93 for a private room and $126.87 for a semi-private room, and the mean revenue per patient day from Medicare funded residents was $371.82.

Not all costs incurred by a nursing home are eligible for reimbursement under the Medicaid reimbursement system. Allowable costs, for Medicaid reimbursement purposes, include the following: regular room, dietary, and nursing services, include minor medical and surgical supplies, and the use of equipment and facilities. Specifically, Medicaid reimburses providers for oxygen and related medications; handfeeding and incontinency care; tray service and enemas; patient gowns, water pitchers, basins, and bedpans; items used by individual patients but which are reusable and expected to be available; special dietary supplements; and laundering of personal clothing[83]. Allowable costs also include the following therapeutic costs for therapy prescribed by a physician: physical therapy, audiology, speech pathology, and occupational therapy.

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[83] Until October 1, 1993, Medicaid also reimbursed providers for special laundering services such as dry-cleaning.

Turning to other components of the reimbursement rate, bad debts are not an allowable cost except where the copayment by the Medicaid patient is not made. Compensation for the owner-administrator and owner-assistant administrator are allowable but subject to limits, which are determined by the state through the use of a statewide salary survey. Negotiation and settlement of facility sale costs are not allowable costs, and capital expenditures are only allowable if the facility gets approval from the CON office.[84] Return on equity is an allowable cost for for-profit facilities, while use allowance is an allowable cost for non-profit, but not government run, facilities. Legal fees are only allowable costs if the nursing home provider wins the lawsuit.[85] The allowability of property costs will be discussed in more detail later in this essay.

Operating and Patient Care Costs

Operating costs and patient care costs are adjusted for inflation, taking into consideration the rate semester and the time covered by the cost report being considered. After the inflation adjustments, per diems are established for each class and for the entire state using the appropriate facility level data.[86] The median per diem for each class and the median statewide per diem are then used to determine the statewide and class ceilings for patient care and operating costs. A ratio is calculated for each class to state median and is used to adjust the facility level per diems by class. It is important to note that facilities in the lower and upper ten percent of the distribution of patient care costs are excluded from the sample for purposes of calculating the standard deviation. The same is done to calculate the standard deviation for operating costs.

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[84] Approval of asset costs for reimbursement by the Certificate-of-Need office has been required since July 1, 1991. In addition, if capital additions and improvements are greater than $0.40 per available bed day for the cost reporting period, the nursing home can request an adjustment in the fair rental value portion of the reimbursement rate.

[85] This limit has been imposed since July 1, 1991.

The statewide ceiling for operating costs is the statewide median plus one standard deviation, as calculated excluding the upper and lower ten percent of operating cost per diems in the state. Similarly, the statewide ceiling for patient care costs is the statewide median plus 1.75 standard deviations of the middle eighty percent of the patient care cost per diems.[87] The class ceilings for patient care and operating costs are simply the statewide ceilings multiplied by the class to state median ratio from above. Notably, there is no size-oriented weighting in the calculation of the ceilings. In other words, the costs for each facility are not weighted by patient days. The lack of a size based weighting method provides incentives for nursing homes to take advantage of economies of scale in nursing home care provision, if they exist.

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[86] There are currently six reimbursement classes based on location and the number of beds in the facility. The state is divided into three regions: North, Central, and South. Nursing homes with more than 100 beds are in a separate class than those with 100 or fewer. Until June 30, 1994, when the Central region was established, there were only four classes and two geographic regions. On July 1, 1994, nursing homes located in Hardee, Highlands, and Polk Counties were "grandfathered in" and are considered as members of the South regional classes until such time that the Central regional class ceiling for the operating and patient care cost components equal or exceed the July 1, 1994, South regional class ceilings.

[87] The use of 1.75 standard deviations began on July 1, 1993, a drop from two standard deviations. One would expect this decrease to decrease costs given incentives to be at the upper bound of the range of acceptable costs.

On January 1, 1988, facility specific target reimbursement rates were established for patient care and operating costs. Prior to the implementation of the Target Rate System, the rates at which a facility's patient care and operating costs were reimbursed were based on the lower of the class based cost ceiling and the facility's cost as taken from the cost report. For example, if the patient care cost as taken from the facility's cost report was higher than the class ceiling for patient care costs, the patient care component of the reimbursement rate would be equal to the class ceiling. After January 1, 1988, the patient care and operating costs portions of the reimbursement rate were restricted to the facility's target rate. For example, the operating cost portion of the reimbursement rate is now limited to the minimum of the following: the operating cost per diem from the cost report, the operating target for the facility, and the class based operating cost ceiling. The targets for operating and patient care costs were calculated by multiplying the provider's latest reimbursement rate excluding incentives by the following formula, where FNHCII is the Florida Nursing Home Cost Inflation Index[88]:

1+target inflation factor[(FNHCII at the midpoint of the prospective period-1)/
(FNHCII at the midpoint of the current rate period)], (20)

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[88] The FNHCII is calculated based on a sample of approximately twenty-five percent of the cost reports filed for each rate-setting period. The percentage of weights for cost components are estimated as follows: salary and benefits, 57.89%; dietary, 5.18%; and other, including fuel, utilities, and other expenses, 36.93%. The inflation index for each of the above components is developed from the Data Resources, Inc.

where the target inflation factor equals 2. On July 1, 1990, the target inflation factor decreased to 1.786, on August 1, 1992, the target inflation factor decreased to 1.5, and on July 1, 1996, the factor decreased again to 1.4. As a result, since it's implementation, the target rate system has placed tighter and tighter limits on cost growth in the areas of patient care and operating costs. On January 1, 1992, the target rates were removed, and, on January 1, 1993, the targets returned. This temporary suspension of the targets was prompted by protests from the provider community and evidence of reasonable costs not being covered.[89]

A provider is exempt from the ceilings discussed above if it is primarily a psychiatric hospital. In other words, the ceilings do not apply if ALL of the following conditions are met: all residents have medical or psychiatric conditions; more than ninety percent of the population suffer from severe behavior, emotional, or cognitive difficulties because of psychiatric impairment; the facility complies with the licensure provisions for specialty psychiatric hospitals; and all residents have a medically approved treatment plan. Currently, only one skilled nursing facility in Florida falls into this category.[90]

Facilities can exceed the class ceilings for operating and patient care costs for six months if they can prove one of the following: the facility has AIDS diagnosed residents needing isolation or the facility has residents that are less than twenty-one years of age who require skilled nursing care.[91] While the period of reimbursement above the ceiling shall not exceed six months, nursing homes with AIDS patients are eligible for a flat rate paid for the identified patients in addition to the average per diem paid to the facility.[92] A similar flat rate is available for ventilator patients who were on ventilators as of October 1, 1985, and for medically fragile patients under the age of twenty-one who require skilled nursing care.[93] Since July 1, 1993, supplemental payments have also made available for patients requiring pressure/bed sore therapy.

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[89] Interview with Wesley Hagler, Medical/Health Care Program Analyst/Coordinator, Agency for Health Care Administration, State of Florida, 22 April 1998.

[90] The exemption for Florida State Hospital in Chattahoochee was first applied on October 22, 1992.

Property Costs

On October 1, 1985, Florida implemented the Fair Rental Value System (FRVS) for property cost and reimbursement. Included in the FRV rate are property costs and return on equity or use allowance. For facilities existing on October 1, 1985, the FRV is based upon assets and acquisition costs at the last acquisition date prior to July 18, 1984. Asset values are indexed from the date of entry into the Medicaid program. If the facility was purchased after July 18, 1984, or if the facility was built after July 18, 1984, and if the facility was not in the Medicaid program before July 18, 1984, the property value, i.e. the fair rental value, will be based on the last acquisition costs prior to enrolling in Medicaid. For the sale or purchase of a facility occurring before July 18, 1984, acquisition costs included land, buildings, equipment, attorneys fees, points paid, and construction loan interest expense; the following are explicitly not included in acquisition costs: property taxes and property insurance expenses. Since July 18, 1984, costs attributable to the sale or purchase of facility have not been deemed allowable costs for Medicaid reimbursement purposes.

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[91] These regulations were implemented on January 1, 1984.

[92] The flat rate for AIDS patients first became available on October 1, 1985, and was expanded on July 1, 1986.

[93] The addition of the flat rate additional reimbursement for the medically fragile under age twenty-one took place on January 1, 1991.

For leases in effect on October 1, 1985, rents were divided into ownership costs of leased property and lease costs. Ownership costs of leased property could include the cost of depreciable assets, property taxes, and property insurance, sales tax on lease payments (unless the parties are related), and return on equity that would be paid to the owner if the owner were the provider. For leases commencing prior to October 1, 1985, the lease cost increases were limited to a maximum of twenty percent over five years or the Florida Construction Cost Inflation Index. After the lease expired, rates based on FRVS applied. If the lease commenced after October 1, 1985, FRVS-based rates applied. If there is a change in ownership, the lowest of the following shall apply for reimbursement purposes: fair market value of the facility, acquisition costs to the owner on July 18, 1984, or acquisition costs to the new owner. It is important to note that there was no specified cap on lease payments prior to the October 1985 switch to FRVS. Given the absence of a cap, it is possible that firms with large numbers of Medicaid patients entered into agreements to pay inflated lease payments to a related party. One limit to such actions was the state implemented per bed cost ceiling for total capital assets of $28,500 on October 1, 1985. Beginning July 1, 1996, the state established a cap on

FRVS property reimbursement, limiting each nursing home's asset valuation to the value on June 30, 1996, until that value no longer exceeds the per bed FRVS standard cap.

A "hold harmless" provision was implemented to ensure that facilities existing and enrolled in the Medicaid program on October 1, 1985, did not receive reimbursement for property and return on equity or use allowance under the FRVS method that was less than the reimbursement being received on September 30, 1985. For nursing homes with an existing lease on October 1, 1985, the greater of the FRVS rate or the depreciation plus interest costs being paid on September 30, 1985, is paid until the FRVS rate catches up to the sum of the 1985 level depreciation and interest costs. This caveat lasts only until the nursing home's lease expires, at which time the nursing home begins reimbursement under the FRVS system.

For facilities with property reimbursement rates on September 30, 1985, that were less than the calculated fair rental value, an FRVS phase-in schedule was implemented. In essence, nursing homes were phased up to the FRVS rate in equal percentage increments over a period of four to ten years. Nursing homes entering into the Medicaid program prior to January 1, 1972, were phased up in four years, while nursing homes entering the program from 1979 to October 1, 1985 were subject to a ten year phase in. Thus, nursing homes with more tenure in terms of Medicaid program participation gained from the transition to the FRVS much more quickly than nursing homes with less tenure.

For initial property cost reimbursement rate-setting purposes, the state examined the most current depreciation schedule provided by a nursing home and indexes the costs forward to October 1, 1985, by a portion of the rate of increase in the Florida Construction Cost Inflation Index (FCCI). From October 1, 1985, to June 30, 1991, the state used the sixth month change in the FCCI for adjusting FRVS rates. Since July 1, 1991, the FCCI has been based on the DRI/McGraw-Hill Health Care Cost index and the CPI for All Urban All Items South Region. The rate increase of the FCCI is subject to a three percent semi-annual maximum. When the FCCI increases by more than three percent, individual nursing homes are issued a credit that is carried over for future periods.

New Providers

New providers include providers that are new to the provision of care to Medicaid patients or new facilities but do not include facilities that have changed ownership. New providers are required to submit a budget, and an interim rate is established and remains in effect until the first cost report is utilized by the agency. The interim cost per diem for a new provider is the lowest of the following for each type of cost, operating and patient care: the class reimbursement ceiling, the approved operating or patient care costs, or the average of the operating costs or patient care costs in the district plus half of the difference between the average district per diem and the class ceiling.[94] The new facility's property cost per diem is the lesser of the following: the fair rental value rate approved or the fair rental value based on the cost per bed six months prior to the date the facility first became a nursing home.

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[94] Prior to July 1, 1991, the interim rate was not subject to limitations of the district average per diem, a limitation know as the New Provider Ceiling.

Incentives

To encourage quality and cost containment, incentive payments based on licensure ratings have been offered to nursing homes since April 1, 1983. Ratings are assessed at the time of the state's annual inspection of the nursing home. A conditional rating implies that the facility failed to meet, or correct upon follow up, minimum standards. A standard rating indicates that the facility meets minimum standards, and a superior rated facility exceeds minimum standards. For nursing homes receiving a conditional rating, no incentive is offered for the duration of time that the nursing home receives a conditional rating. Until July 1, 1995, nursing home with a standard rating received an incentive equal to .3333(operating cost class ceiling-operating cost per diem for the facility) as long at the facility's operating costs are less than the class operating cost ceiling. This incentive was limited to twenty percent of the class ceiling amount. In contrast, if a nursing home was rated superior, the nursing home was eligible for incentives based on both operating costs and patient care costs. For a nursing home with operating costs that were less than the class operating cost ceiling, the operating cost incentive was equal to .6667(operating cost class ceiling-operating cost for the facility), where the incentive was limited to twenty percent of the class ceiling. Until January 1, 1988, the patient care cost incentive for a nursing home with patient care costs that were less than the class patient care cost ceiling was equal to .1(patient care cost class ceiling-patient care cost for the facility), where the incentive is limited to five percent of the class ceiling. Clearly, the higher ratings translated into larger incentive payments, ceteris paribus. In addition, lower cost facilities, relative to others in the class, receive larger incentive payments.

On July 1, 1985, the agency began using a weighted average of the ratings and using licensure ratings that were in effect in the rate semester one year prior to the period being considered to determine the incentives. For example, for the January 1, 1986, to June 30, 1986, rate semester, the licensure ratings from January 1, 1985, to June 30, 1985, would be used. On January 1, 1988, when operating cost targets for individual facilities were first implemented, the operating cost incentives changed slightly; currently, the lower of the operating cost per diem for the facility and the operating target per diem for facility must be less than the class operating cost ceiling.[95]

The operating incentive was limited to twenty percent of the class ceiling from it's inception until December 31, 1987. From January 1, 1988, to June 30, 1995, the operating incentive was limited to fifteen percent of the class operating reimbursement ceiling. The percentage fell again on July 1, 1995, to ten percent of the class operating reimbursement ceiling. Along similar lines, the factor by which the difference between the operating cost for the class ceiling and the operating cost for the facility was multiplied dropped from .6667 to .64 for facilities with a superior rating and from .3333 to .32 for those with a standard rating on July 1, 1995. For patient care costs, the factor decreased from .1 to .03 on January 1, 1988. Clearly, the cost and quality incentives have decreased in value and, thus, weakened, over time.

Along with the aforementioned changes, on July 1, 1993, incentive payments were prorated for the first time based upon a facility's Medicaid utilization percentage (MUP).[96] If a facility's Medicaid utilization rate was greater than or equal to ninety percent, the facility would be eligible for all of the incentives discussed above. Facilities with twenty percent or less Medicaid utilization received no incentives. For facilities falling between ninety and twenty percent, the incentives were prorated using the following formula:

$$\text{Prorated Incentives}=\text{Incentives}*\{100*[(\text{MUP}-20\%)/70\%]\} \tag{21}$$

On July 1, 1995, the prorating rules changed. Facilities without more than 65 percent Medicaid utilization now receive no operating incentives. In addition, the prorating formula for operating incentives changed to the following:

$$\text{Prorated Incentives}=\text{Incentives}*\{100*[(\text{MUP}-65\%)/25\%]\} \tag{22}$$

On July 1, 1996, all of the above operating and patient care quality and cost incentives were abolished. The incentives, which had been weakening over time for all nursing homes, have been replaced by the Medicaid Adjustment Rate (MAR). Since the implementation of the new MAR, no incentives have been provided for nursing homes with a Medicaid utilization rate of fifty percent or less. A prorated incentive is provided

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[95] Previously, only the operating cost per diem for the facility had to be less than the ceiling.

for nursing homes with a Medicaid utilization rate of more than fifty percent and less than ninety percent, while nursing homes with at least ninety percent of beds filled by Medicaid patients are eligible for the full incentive. The incentive is based on patient care costs, percent Medicaid utilization, and the number of days in the cost reporting period for which the nursing home received a standard or superior rating.

Three aspects of the plan point to changes in reimbursement incentive policy. First, only patient care costs are factored into the incentive, removing the tradition of providing an operating cost incentive. Second, the incentive is not based upon the distance of the facility's costs from the class ceiling or operating target. Thus, the cost control incentive has been removed. Finally, a larger incentive is no longer provided for a facility with a superior rating; standard and superior ratings are counted as equivalent for incentive purposes.

Over time, acceptance of large numbers of Medicaid patients by nursing homes has been rewarded more, and there have been decreasing incentives for nursing homes with few Medicaid patients to maintain high quality levels and cost controls. With incentives being provided at greater levels to homes with a high percentage of Medicaid patients, one might expect to see more segregation of Medicaid patients into Medicaid dominated homes or an effort by nursing homes to get rid of nursing home patients

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[96] The Medicaid utilization percentage is defined as the total number of Medicaid bed days divided by the total number of bed days for a facility. The terms Medicaid utilization rate and Medicaid utilization percentage are interchangeable.

funded by Medicaid. Moreover, the lumping together of standard and superior ratings in the MAR may result in more standard facilities that are Medicaid dominated.

An additional adjustment is made to the patient care per diem, the operating cost per diem, and the return on equity or use allowance per diem for low occupancy.[97] After calculating the percentage occupancy for each facility, the mean occupancy statewide, and the standard deviation of the percent occupancy, each of the per diems is adjusted as follows:

Adjusted Per Diem=Per Diem*[Facility Occ. %/(State Mean Occ.%
One Std. Dev.)] (23)[98]

This adjustment is not applied if the facility's occupancy level is greater than the statewide average occupancy less one standard deviation. In other words, there is no bonus for higher than average occupancy. Facilities with only one cost report filed and facilities with a high percentage of Medicaid patients are not subject to the adjustment.[99]

Since January 1, 1986, an adjustment in property cost indexing has been applied to nursing homes that have failed a licensure reinspection and that have low Medicaid utilization levels. If a nursing home receives a conditional rating upon inspection and if the nursing home does not correct the cited problems prior to the next inspection, the state conducts no indexing in the FRVS rate for the next full six month period following reinspection. If the Medicaid utilization rate is less than 25 percent, there is no indexing of asset valuation. If the Medicaid utilization rate is greater than or equal to 25 percent but less than 55 percent, assets are indexed as follows:

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[97] If the property of a nursing home is not yet being compensated under the fair rental value system, the low occupancy penalty is also applied to property costs.

[98] The adjustment to patient care and operating costs must not result in a reduction of more than thirty percent of the appropriate class ceiling.

[99] If the percentage of Medicaid days relative to total bed days for a facility is greater than the statewide mean percentage of Medicaid days less one standard deviation, the facility is exempt from the low occupancy penalty.

$$\text{Indexing factor}=(\text{increase in the FCCI index})(\text{Medicaid utilization rate}/55\text{ percent}) \tag{24}$$

If the Medicaid utilization rate is greater than or equal to 55 percent, full indexing of asset values is conducted.

Temporary Changes

In the past, rates have been frozen due to budgetary problems. Following a legislative budget reduction, the rates were frozen on January 1, 1990, for a six month period. As mentioned above, two years later, on January 1, 1992, the provider community was successful in it's drive to get facility based target rates removed for a six month period. Along similar lines, there was a two percent reduction in the FRV property portion of the reimbursement rate that lasted from July 1, 1991, to August 1, 1992. One month before the end of the reduction in the property component, on July 1, 1992, a bed tax on all nursing home beds was implemented due to a short-term budgetary shortfall. The tax was removed on May 1, 1993.

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